Dell™ PowerVault™ 720N, 740N, and 760N

INSTALLATION AND TROUBLESHOOTING GUIDE

April 1999 P/N 3385P Rev. A00

Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your computer or storage system from potential damage.

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks of text are notes, cautions, and warnings, and they are used as follows:

NOTE: A NOTE contains important information that helps you install or operate the system efficiently.

CAUTION: A CAUTION contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING: A WARNING contains instructions that you must follow to avoid personal injury.

Safety Warnings

Observe the following warnings while servicing this system:

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

WARNING: The power supplies in your computer or storage system may produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer covers and access any of the components inside the computer.

WARNING: This system may have more than one power supply cable. To reduce the risk of electrical shock, a trained service technician must disconnect all power supply cables before servicing the system.

DŮLEŽITÉ UPOZORNĚNÍ: Tento systém může mít více napájecích kabelů. Ke snížení rizika úrazu elektrickým proudem je nutné, aby školený servisní technik před prováděním servisu systému odpojil všechny napájecí kabely.

ADVARSEL: Dette system kan have mere end et strømforsyningskabel. For at reducere risikoen for elektrisk stød, bør en professionel servicetekniker frakoble alle strømforsyningskabler, før systemet serviceres.

VAROITUS: Tässä järjestelmässä voi olla useampi kuin yksi virtajohto. Sähköiskuvaaran pienentämiseksi ammattitaitoisen huoltohenkilön on irrotettava kaikki virtajohdot ennen järjestelmän huoltamista.

ПРЕДУПРЕЖДЕНИЕ: Данная система может иметь несколько кабелей электропитания. Во избежание электрического удара квалифицированный техник должен отключить все кабели электропитания прежде, чем приступить к обслуживанию системы.

OSTRZEŻENIE: System ten może mieć więcej niż jeden kabel zasilania. Aby zmniejszyć ryzyko porażenia prądem, przed naprawą lub konserwacją systemu wszystkie kable zasilania powinny być odłączone przez przeszkolonego technika obsługi.

ADVARSEL! Det er mulig at dette systemet har mer enn én strømledning. Unngå fare for støt: En erfaren servicetekniker må koble fra alle strømledninger før det utføres service på systemet.

VARNING: Detta system kan ha flera nätkablar. En behörig servicetekniker måste koppla loss alla nätkablar innan service utförs för att minska risken för elektriska stötar.

Additional Safety Precautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

General Precautions

Observe the following general precautions for using and working with your system:

- Observe and follow service markings. Do not service any Dell product except as explained in your Dell system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a Dell authorized service technician.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your Dell authorized service provider:
  - — The power cable, extension cord, or plug is damaged.
  - — An object has fallen into the product.
  - — The product has been exposed to water.
  - — The product has been dropped or damaged.
  - — The product does not operate correctly when you follow the operating instructions.

- Keep your system components away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the computer gets wet, see the appropriate chapter in your troubleshooting guide or contact a Dell-authorized service provider.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with Dell products or other Dell-approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your Dell service provider or local power company.
- To help avoid damaging your system components, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:
  - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
  - 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure that your monitor and attached peripherals are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your computer or storage system or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system components and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cord, use a three-wire cord with properly grounded plugs.
- Observe extension cord and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cord or power strip does not exceed 80 percent of the extension cord or power strip ampere ratings limit.
- Do not use appliance/voltage converters or kits sold for appliances with your Dell product.
- To help protect your system components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

- Position cables and power cords carefully; route cables and the power cord and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your system components' cables or power cord.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.
- Turn down the volume before using headphones or other audio devices.

Precautions for Server and Storage Systems

Observe the following additional safety guidelines for your system:

- Unless your installation and/or troubleshooting documentation specifically allows it, do not remove enclosure covers, attempt to override the safety interlocks, or access any components inside the system. Depending on your system, installation and repairs may be done only by individuals who are qualified to service your computer or storage system equipment and trained to deal with products capable of producing hazardous energy levels.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your Dell product, observe the following guidelines:
  - — Install the power supply before connecting the power cable to the power supply.
  - — Unplug the power cable before removing the power supply.
  - — If the system has multiple sources of power, disconnect power from the system by unplugging *all* power cables from the power supplies.
- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the computer or storage system. Avoid sudden stops and uneven surfaces.

Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.

WARNING: After installing system components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.

NOTE: Dell's server and storage systems are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.
- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.
- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Extend only one component at a time from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
- Ensure that proper airflow is provided to components in the rack.
- Do not step on or stand on any system/component when servicing other systems/components in a rack.

Precautions for Products With Modems, Telecommunications, or Local Area Network Options

Observe the following guidelines when working with options:

- Do not connect or use a modem or telephone during a lightning storm. There may be a risk of electrical shock from lightning.
- Never connect or use a modem or telephone in a wet environment.
- Do not plug a modem or telephone cable into the network interface controller (NIC) receptacle.

- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.
- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

Precautions for Products With Laser Devices

Observe the following precautions for laser devices:

- Do not open any panels, operate controls, make adjustments, or perform procedures on a laser device other than those specified in the product's documentation.
- Only authorized service technicians should repair laser devices.

When Working Inside Your Computer

Before you remove the computer covers, perform the following steps in the sequence indicated.

WARNING: Some Dell systems can be serviced only by trained service technicians because of high voltages and energy hazards. Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.

CAUTION: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.

1. Turn off your computer and any peripherals.
2. Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.
3. Disconnect your computer and peripherals from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.

- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following notice may appear throughout this document to remind you of these precautions:

WARNING: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.

Ergonomic Computing Habits

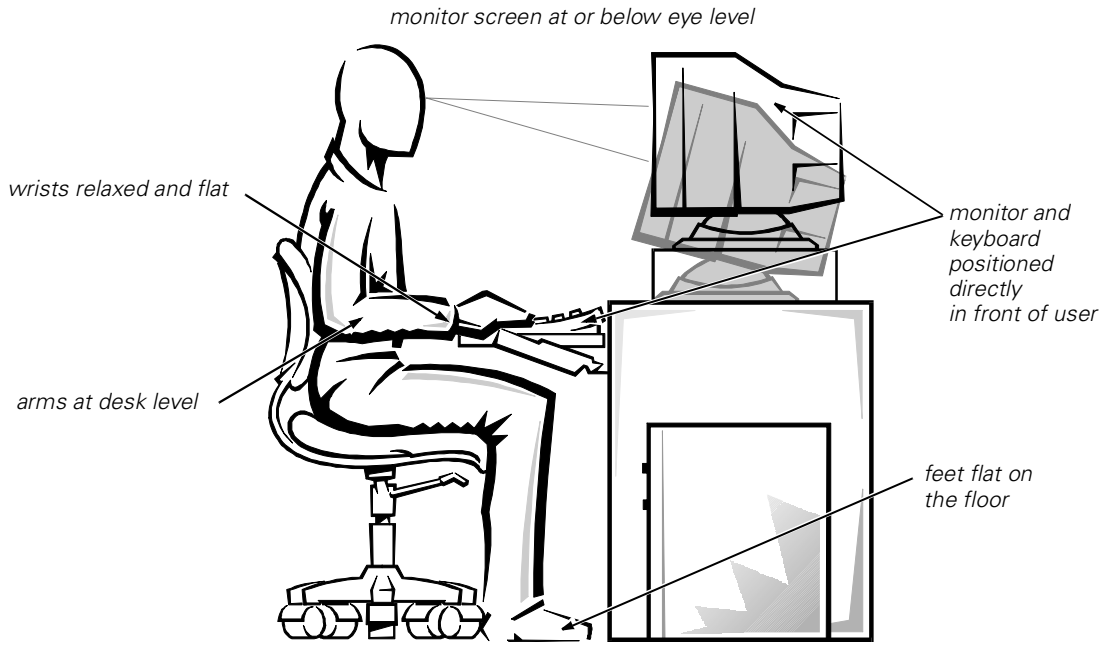
WARNING: Improper or prolonged keyboard use may result in injury.

WARNING: Viewing the monitor screen for extended periods of time may result in eye strain.

For comfort and efficiency, observe the following ergonomic guidelines when you set up and use your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.

- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure that the monitor screen is at eye level or slightly lower when you sit in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.
- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while you use the keyboard or mouse.
- Always leave space to rest your hands while you use the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.



Preface

About This Guide

This guide describes how to install a PowerVault 720N, 740N, or a 760N filer in a rack, connect it to a PowerVault 700N Disk-Array Enclosure (DAE) storage system and to an optional tape backup device, and start up the system. The chapters in this guide are summarized as follows:

- Chapter 1, "Introducing the Dell PowerVault 720N, 740N, and 760N Filers" introduces the standard and optional features and gives the slot assignments for the supported expansion cards for the three filers.
- Chapter 2, "Installing a Filer System" provides detailed procedures for installing a filer in a rack and cabling the filer to PowerVault 700N storage system(s) and to a tape backup device.
- Chapter 3, "Troubleshooting the Filer Hardware" provides information on troubleshooting the filer, based on light-emitting diode (LED) status displays and liquid-crystal display (LCD) panel error and informational messages.
- Chapter 4, "Getting Help" describes the help tools Dell provides to assist you should you have a problem with the filer. It also explains how and when to call Dell for technical assistance. Chapter 4 also includes a diagnostics checklist that you can copy and fill out as you perform the troubleshooting procedures. If you need to call Dell for technical assistance, use the completed checklist to tell the Dell technical support representative what procedures you performed to better help the representative give you assistance. If you must return a piece of hardware to Dell, include a filled-out checklist.

Audience

This guide is for system administrators and trained computer equipment installation technicians who are familiar with network data servers and how the Network File System (NFS), Common Internet File System (CIFS), and Hypertext Transfer Protocol (HTTP) protocols are used to share and transfer files.

Terminology

This guide uses the following terms:

- *Filer* refers to a PowerVault 720N, 740N, or 760N network data server.
- *System* refers, at a minimum, to a filer and a connected PowerVault 700N storage system. An optional tape backup device can also be a component of the system.
- *Disk storage system* refers to a single PowerVault 700N storage system or a fibre channel-arbitrated loop (FC-AL) of several PowerVault 700N storage systems.

Other Documents You May Need

In addition to this guide, the following documentation is included with your system or with the PowerVault 700N storage system:

- The *Dell PowerVault 720N, 740N, and 760N Storage System Installation and Service Guide,* for installing and servicing the PowerVault 700N storage system.
- The *Dell PowerVault 720N, 740N, and 760N User's Guide* for using the filer.
- *Getting Started With the Dell PowerVault 7xxN Storage System* for initial setup and cabling of the filer and attached PowerVault 700N storage system units.
- The *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for setting up and administering the filer.
- The *Dell PowerVault 720N, 740N, and 760N Quick Reference* card for a quick reference to commands used to administer and use the filer.

You may also have one or more of the following documents.

NOTE: Documentation updates are sometimes included with your system to describe changes to your system or software. Always read these updates ***before*** *consulting any other documentation because the updates often contain the latest information.*

- Operating system documentation is included if you ordered your operating system software from Dell. This documentation describes how to install (if necessary), configure, and use your operating system software.
- Documentation is included with any options you purchase separately from your system. This documentation includes information that you need to configure and install these options in your Dell computer.
- Technical information files—sometimes called "readme" files—may be installed on your hard-disk drive to provide last-minute updates about technical changes to your system or advanced technical reference material intended for experienced users or technicians.

Notational Conventions

Table 1 lists the kinds of formatting this guide uses to identify special information.

Table 1. Notational Conventions

Formatting convention	Type of information
Italic type	• Words or characters that require special attention. • File names and path names. • Placeholders for information you must supply. For example, if the guide says to enter the **`arp -d`** *hostname* command, you enter the characters "arp -d" followed by the actual name of the host. • Manual page names. • Book titles in cross-references.
`Monospaced` font	• Command and daemon names. • Information displayed on the system console or other computer monitors. • The contents of files.
`Bold monospace` font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters for it to work properly.

Special Messages

This guide contains special messages that are described as follows:

NOTE: A NOTE contains important information that helps you install or operate the system efficiently.

CAUTION: A CAUTION contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

WARNING: A WARNING contains instructions that you must follow to avoid personal injury.

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CHAPTER 1
Introduction

About the 720N, 740N, and 760N Filers

What Is a Filer?

Dell™ PowerVault™ 720N, 740N, and 760N filers are dedicated, special-purpose network data servers that provide fast and reliable file service to network clients connected to Ethernet networks.

The 720N, 740N, and 760N Filers

The 720N, 740N, and 760N filer differences are based on performance, capacity, and networking.

Standard and Optional Features

Standard Features

The filer standard features are described in three parts—those that you can see from the front panel, those that you can see with the front bezel removed, and those that you can see from the back panel.

Standard Features That You Can See From the Front Panel

Figure 1-1 shows the standard features that you can see from the front panel.

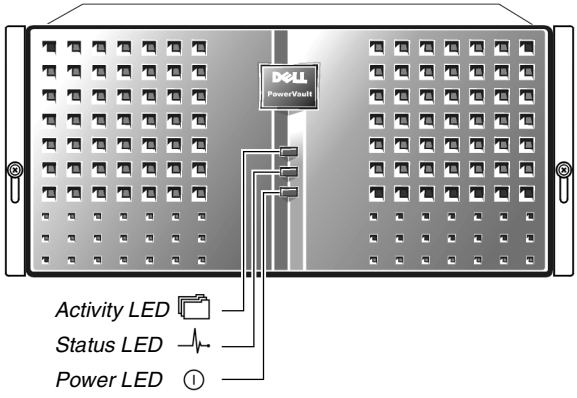


Figure 1-1. Front Panel Features

Table 1-1 describes the front panel features.

Table 1-1. Front Panel Features Defined

Standard Feature	Benefits
Installation Brackets	When you install the filer in an equipment rack, you attach its installation brackets to the front rails of the rack. A right-angle mounting bracket running the length of each side of the filer chassis rests on similar brackets mounted inside each side of the rack cabinet.
LEDs (Light Emitting Diodes)	The LEDs on the front panel report system status and network activity. A glance at these LEDs lets you know right away whether the filer requires troubleshooting. The LEDs are described in the section, "LEDs on the front and back panel," in Chapter 3.

Standard Features Behind the Front Bezel

Figure 1-2 shows the standard features that you can see with the front bezel removed.

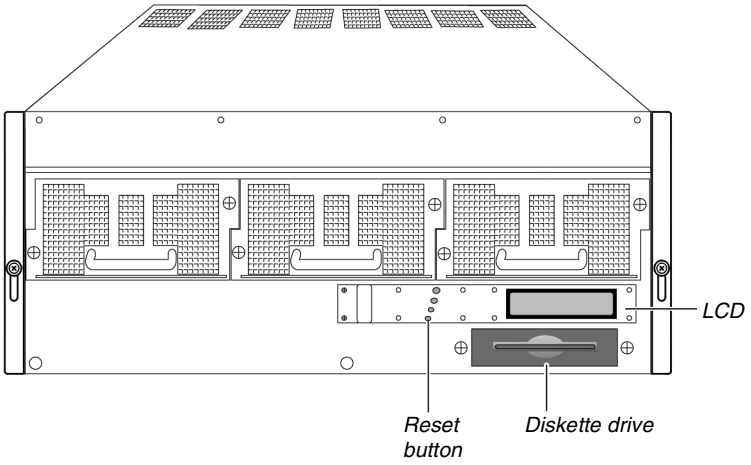


Figure 1-2. Features Behind the Front Bezel

Table 1-2 describes the features that you can see after the front bezel is removed.

Table 1-2. Features Behind the Front Bezel Described

Standard Feature	Benefits
Reset Button	This button is behind the front bezel so that you cannot reset the filer inadvertently. It enables you to reset the filer in those rare cases when the system fails or you upgrade the software. To reset the filer, remove the front bezel and push the reset button, located below the power LED.
Diskette Drive	This drive enables you to boot the system from a diskette when the system fails to start from the hard disk. You also use this drive to run diagnostics using the diagnostics diskette.
LCD (Liquid Crystal Display)	The LCD displays status, error, and diagnostic messages up to 32 characters long. The LCD messages are described in the section, "LCD messages," in Chapter 3.

Standard Features That You Can See From the Back Panel

Figure 1-3 shows the standard features that you can see from the back panel.

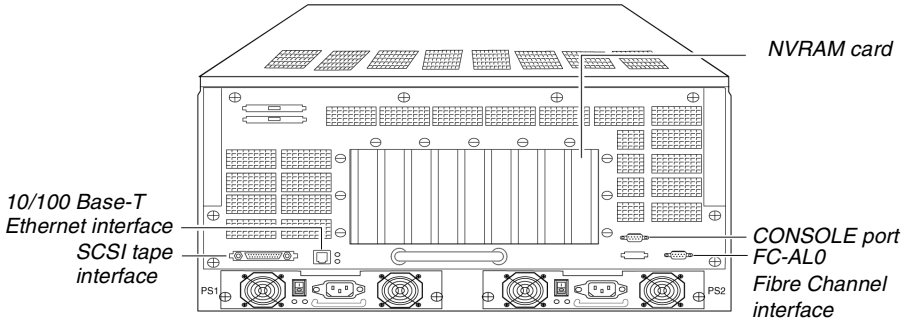


Figure 1-3. Standard Back Panel Features

Table 1-3 describes the back panel features.

Table 1-3. Back Panel Features Described

Standard Features	Benefits
10/100Base-T Ethernet interface	The built-in interface provides a 10Base-T or 100Base-T Ethernet connection. The interface automatically determines the medium type (10Base-T or 100Base-T). Two LEDs report on the status of the interface (see LEDs on the front and back panels, in Chapter 3). You do not need to order an Ethernet Network Interface Card (NIC).
SCSI Tape Interface	The built-in, wide differential SCSI (Small Computer System Interface) interface provides a connection to a SCSI tape backup device.
Power Supplies	The filer comes with two autoranging power supplies. The first power supply, on the left side, is labeled PS 1; the second is labeled PS 2. Each power supply provides +5V, +3.3V, +12V, and -12V output DC power. Two LEDs report on its status. A retaining clip secures the power cord to the filer. Two power supplies provide: • Redundancy—When one power supply fails, the other takes over and provides power for the filer until you replace the failed power supply. • Hot swapping—You can replace one power supply while the second is running without disrupting service.

Table 1-3. Back Panel Features Described *(continued)*

Standard Features	Benefits
Serial Port	CONSOLE port—Provides a console connection from which you can monitor and manage the filer. After you install the filer in a rack, you configure it for network operation from the console. Later, you can use the console to access and manage the filer when a remote connection is not available.
FC-AL Disk Interface	The built-in interface provides an FC-AL (Fibre Channel Arbitrated Loop) connection to the Dell PowerVault 700N Disk-Array Enclosure (DAE) storage system with 18-GB disk drives.
NVRAM Card	This card provides Non-Volatile Random Access Memory. It stores in-transit data before the data is permanently written to disk.

Optional Features

An optional feature is a feature that you can use or order for your system to supplement the standard features.

The optional features fall into five categories:

- Additional NICs
- Additional FC-AL adapters

Your filer ships with the optional features you selected installed. You can also order optional features later.

Additional NICs

You can order the following Ethernet NICs for additional network connectivity:

- Single-port 10/100Base-T NIC
- Quad-port 10/100Base-T NIC
- Gigabit (GB) NIC

Figure 1-4 shows the back panel of a filer with two quad-port 10/100Base-T Ethernet cards installed in slots 1 and 2, and a GB Ethernet card installed in slot 6.

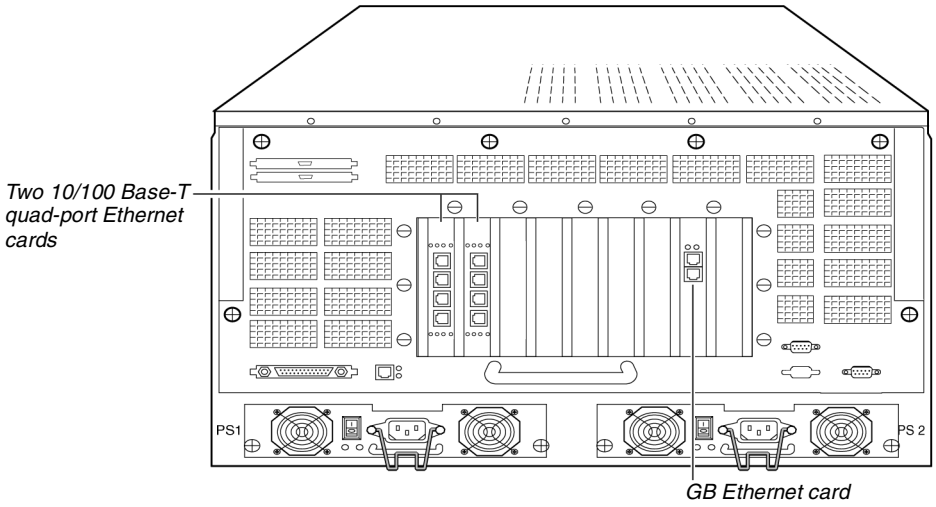


Figure 1-4. Ethernet Network Interface Cards

Additional FC-AL Disk Adapters

You can order an FC-AL adapter for additional fibre channel disk storage.

Table 1-4 shows how much fibre channel disk storage capacity each filer supports. The number of loops includes the loop connected to the built-in FC-AL interface.

Table 1-4. Fibre Channel Arbitrated Loop Disk Adapters

Filer	Max. Number of Additional FC-AL Adapters	Max. Number of Loops	Max. Number of 18-GB Drives	Max. Data Storage, in Terabytes
720N	None	One	30	0.5 TB
740N	One	Two	60	1.0 TB
760N	Two	Three	80	1.5 TB

NOTE: By connecting two or three loops to the filer you can spread the storage load over several interfaces. You must, however, observe the disk storage limit.

The FC-AL disk adapters in all three PowerVault Filers are supported by one or more PowerVault 700N storage systems.

About the Expansion Slots

The filer has nine expansion slots on the system board. Slot 9 is dedicated to the NVRAM card. The remaining eight expansion slots are for additional cards and adapters that enable you to expand your network connectivity and disk storage capacity.

The connectors of the cards and adapters installed in the slots fit through the slot openings in the filer's back panel. Figure 1-5 shows the expansion slots as viewed from the back panel.

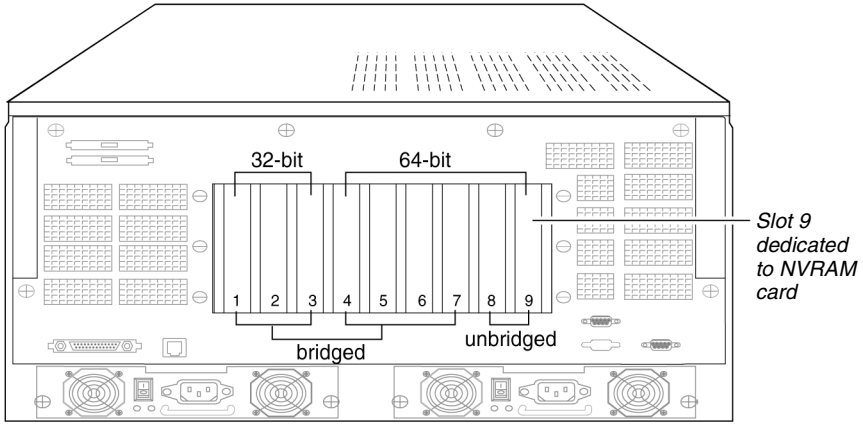


Figure 1-5. Expansion Slot Locations

Slot Assignments

- Table 1-5 shows the available slots on each filer. The bullet (●) indicates an available slot. Shaded boxes indicate unavailable slots.

Table 1-5. Available Slots — All Filers

Filer	Available Slots								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
720N	•	•						•	
740N	•	•	•			•	•	•	
760N	•	•	•	•	•	•	•	•	

720N Slot Assignments

Table 1-6 gives the slot assignments for the available three slots on the 720N.

Table 1-6. Slot Assignments for the 720N

Supported Cards and Adapters	Max No.	Available Slots								
		1	2	3	4	5	6	7	8	9
Single-port 10/100Base-T Ethernet Card	(2)	•	•							
Quad-port 10/100Base-T Ethernet Card	(2)	•	•							
Gigabit (GB) Ethernet	(1)								•	
NVRAM card	(1)									•

740N Slot Assignments

Table 1-7 gives the slot assignments for the available six slots on the 740N.

Table 1-7. Slot Assignments for the 740N

Supported Cards and Adapters	Max No.	Available Slots								
		1	2	3	4	5	6	7	8	9
Single-Port 10/100Base-T Ethernet Card	(3)	•	•	•						
Quad-Port 10/100Base-T Ethernet Card	(3)	•	•	•						
GB Ethernet	(3)						•	•	•	
FC-AL Adapter	(2)						•	•		
NVRAM Card Only	(1)									•

760N Slot Assignments

Table 1-8 gives the slot assignments for the available eight slots on the 760N.

Table 1-8. Slot Assignments for the 760N

Supported Cards and Adapters	Max No.	Available Slots								
		1	2	3	4	5	6	7	8	9
Single-Port 10/100Base-T Ethernet Card	(3)	•	•	•						
Quad-Port 10/100Base-T Ethernet Card	(3)	•	•	•						
GB Ethernet Card	(4)					•	•	•	•	
FC-AL Adapter	(2)				•			•		
NVRAM Card Only	(1)									•

Components in a Complete System

The Filer Is Part of a System

As a network data server, the function of the PowerVault 720N, 740N, or 760N filer is to move data over the network in response to a client request. The filer uses Data ONTAP™ operating system software to do so. The data is stored on storage disks that reside in PowerVault 700N storage systems connected to the filer. In addition, a SCSI tape backup device is recommended for regular backups to protect your data. Therefore, a complete system consists of a filer connected to one or more PowerVault 700N storage systems, plus an optional (but recommended) tape backup device.

Illustration of a System

Figure 1-6 shows a filer installed in a rack above two daisy-chained PowerVault 700N storage systems, and a tape backup device.

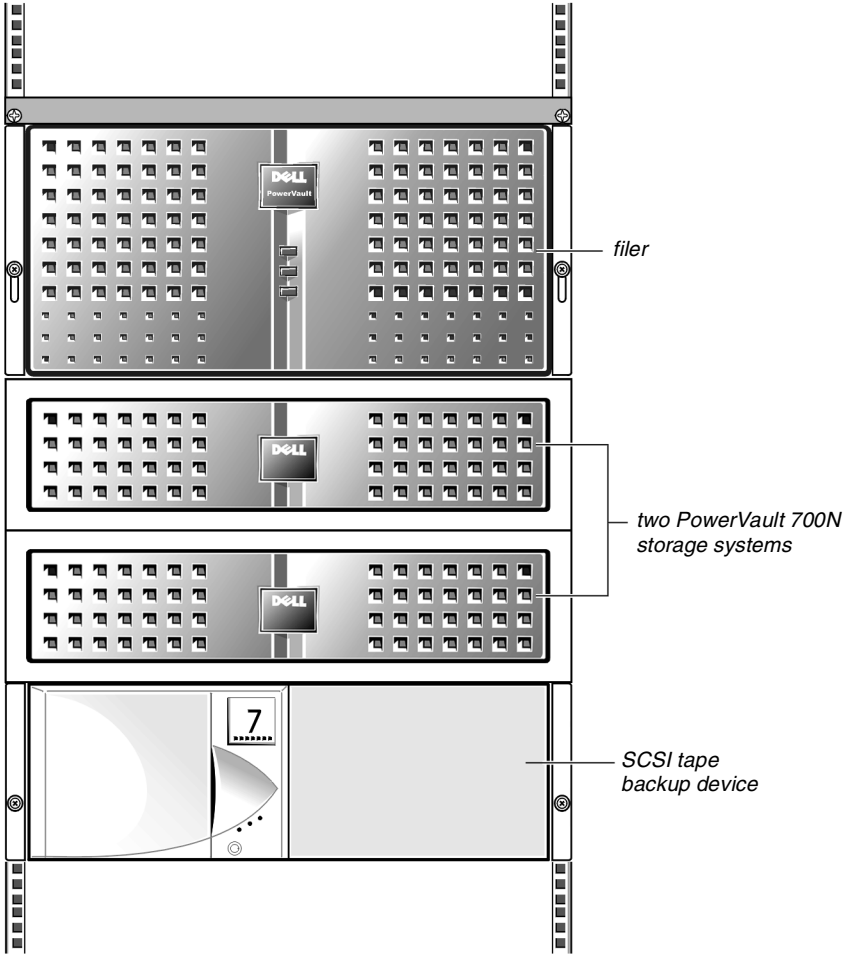
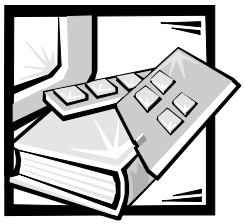


Figure 1-6. A Typical PowerVault Filer System



CHAPTER 2
Installing a Filer System

Overview of the Basic Installation

Procedures in the Installation

The following list provides an overview of the procedures you perform to install the filer and the rest of the units in the system:

- Preparing for the installation
- Installing the filer in a rack
- Connecting the filer to a PowerVault 700N Disk-Array Enclosure (DAE) storage system
- Connecting the filer to the network
- Establishing a console terminal connection to the filer
- Connecting the system to a power source

Chapter Contents

This chapter provides instructions for installing the filer and connecting the PowerVault 700N storage system and backup tape device for the first time

NOTE: This chapter does not provide instructions for installing the PowerVault 700N storage system or a tape backup device. For instructions about those topics, refer to the hardware guide provided with the equipment.

Preparing for the Installation

Check the Installation Requirements

Before you install your system, make sure that you meet the following tools, equipment, environmental, electrical, space, and location requirements.

CAUTION: Your system might not operate properly if you do not meet the requirements.

Tools And Equipment Requirements

You need the following tools and equipment to install the filer.

- A 19-inch (483-mm.) rack conforming to ANSI/EIA-310-D-92. If you do not install the system components in a rack, you must provide additional grounding.
- Phillips #1 and #2 screwdrivers.
- A cage-nut installation tool (included in the rack mounting kit).
- A torque-measuring wrench capable of measuring up to 30 inch-pounds (3.389 newton-meters) torque.

NOTE: If the provided screws do not fit the rack holes, obtain the appropriate screws.

Environmental Requirements

Table 2-1 lists the environmental requirements.

Table 2-1. Temperature and Humidity Requirements

Environmental Condition	Operating Condition	Non-Operating Condition
Temperature range	50° F to 104° F (10° C to 40° C)	–4° F to 149° F (–20° C to 65° C)
Relative humidity	10% to 90% (noncondensing)	5% to 90% in original shipping container (noncondensing) Otherwise, 50% (noncondensing)

Electrical Requirements

Table 2-2 lists the electrical power requirements.

Table 2-2. Electrical Power Requirements

Condition	Requirement
Power supply	90 to 250V AC single phase
Maximum current	4A at 90V AC (RATED)
Frequency	47 to 63 Hz
Power	**Rating**
Watts	300 max. (with Power Factor)
BTU/hr	1025 max.

Space and Location Requirements

Table 2-3 gives the filer's dimensions and weight.

Table 2-3. Equipment Dimensions and Weight (With Filler Panel)

Dimensions and Weight			Rack Units
Height	9.625 in	24.4 cm	5.5 U (1 U =1.75 inch)
Width	17 in	43.18 cm	
Depth	25.25 in	64.14 cm	
Weight*	64 lbs.	29 kg.	

**Weight with all expansion slots filled.*

Table 2-4 describes the recommended minimum clearance for the filer.

Table 2-4. Clearance Requirements (With Filler Panel)

Recommended Minimum Clearance		
Front clearance	22.86 cm	9.0 in.
Back clearance	170.2 cm	67 in.
Additional work space in back	60.96 cm	24 in.
Vertical rack space	24.4 cm	9.625 in.
Top clearance, only in back	22.2 mm	0.875 in.

Check the Shipment Package

Ensure that your shipment package includes:

- One or more filers with the expansion cards you ordered installed in the filer
- Two power cords (one for each power supply)
- FC-AL cables for connecting the filer to the PowerVault 700N storage system
- A disposable electrostatic discharge (ESD) wrist strap and grounding leash
- Documentation kit with software
- Diagnostic loopback cable (for Ethernet NIC)
- Serial console cables (one straight through cable, one null modem cable)

- A rack mounting kit, consisting of:
  - — Two rack adapter rails and mounting hardware
  - — A 1/2-U filler panel and mounting hardware (including cage nuts and cage nut installation tool)
  - — A cable management clip with mounting hardware

Installing the Filer in a Rack

Rack Installation Requirements

Observe the following requirements, cautions, and warnings when you install the filer in a rack (the filer ships with front installation brackets installed).

- Ensure that the rack mounting holes meet ANSI/EIA-310-D-92 specifications for 19-inch (483-mm.) wide equipment.
- Ensure that equipment installed above the filer is no closer than 0.875-inch (22.2-mm) from the top of the filer's ventilation holes.

CAUTION: You must wear an ESD wrist strap when you handle electronic equipment. If you do not, you can damage the equipment by discharging ESD voltages that accumulate on you as you move about. The ESD wrist strap discharges the ESD voltage.

WARNING: The filer weighs up to 64 lbs. (29.03 kg.). To avoid injuring yourself or damaging the filer, you must work with at least one other person when you install the filer in the rack.

CAUTION: When using PowerVault 700N storage systems in a Fibre Channel Arbitrated Loop, you must install the entire system in a Dell rack to meet FCC emission requirements. Dell does not guarantee the performance of a system with PowerVault 700N storage systems if it is not installed in a Dell rack.

Installing the Rack Adapter Rails in the Rack

The left- and right-hand rack adapter rails have six threaded holes on the front and four on the back. The multiple holes allow users to install the rack adapter rails in either whole-unit or half-unit rack mount positions. The six threaded holes are labeled 1 through 6 on the front and 7 through 10 on the back, with stamped numbers.

To install the rack adapter rails in a standard 19-inch (483-mm.) equipment rack, perform the following steps:

1. Locate marks on the rack's left and right front vertical rails. These marks are 1-U spacing marks that appear every 1.75 inches of vertical rack height (see Figure 2-1).

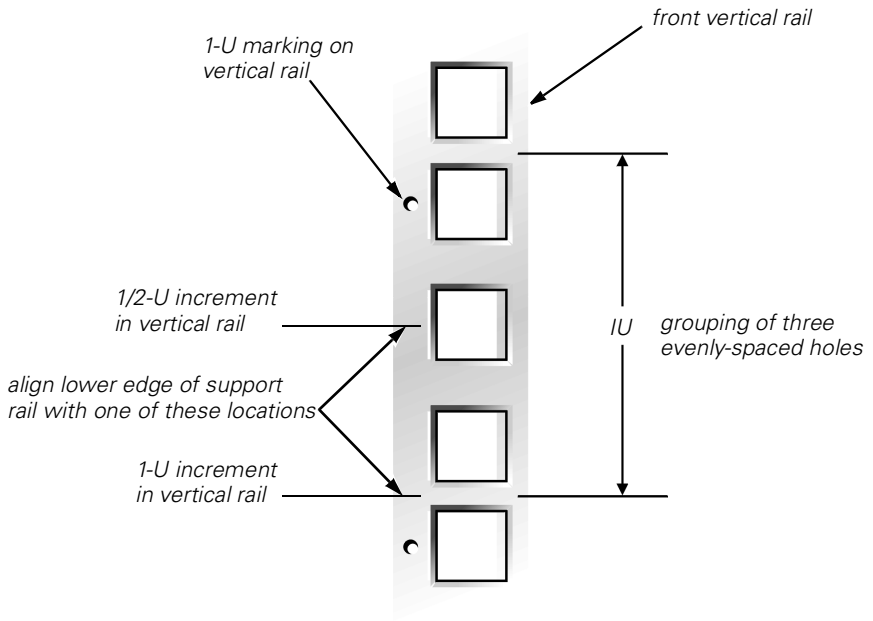


Figure 2-1. Rack Vertical Rail (With 1-U Marks)

2. To attach each rack adapter rail to whole-U or half-U positions on the vertical rails, perform the following steps:

    a. At the front of the rack, install the rack adapter rail using threaded holes 1 and 5 for whole-U positions and holes 2 and 6 for half-U positions (see Figure 2-2).

    b. Secure the front of each rack adapter rail with two 10-32 x 0.375-inch countersunk screws with conical washers provided with the mounting hardware (see Figure 2-2).

    c. Using a torque-measuring wrench, tighten the rack adapter rail to the vertical rail to 27 inch pounds (3.0 newton meters).

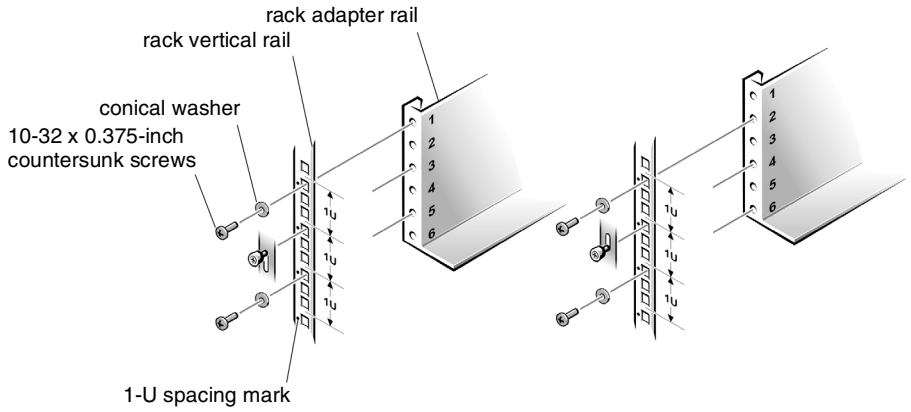


Figure 2-2. Front of Rack Adapter Rail — Whole-U and Half-U Alignment

d. At the back of the rack, secure the rack adapter rail to the rack's vertical rail using two 10-32 x 0.375-inch screws and conical washers.

   If you used hole numbers 1 and 5 at the front of the rack, hole numbers 8 and 10 will align to holes on the vertical rail (for whole-U alignment).

   If you used hole numbers 2 and 6 at the front of the rack, hole numbers 7 and 9 will align to holes on the vertical rail (for half-U alignment). See Figure 2-3.

e. Using a torque-measuring wrench, tighten the rack adapter rail to the vertical rail to 27 inch pounds (3.0 newton meters).

   Figure 2-4 shows the rack adapter rails properly positioned in the rack.

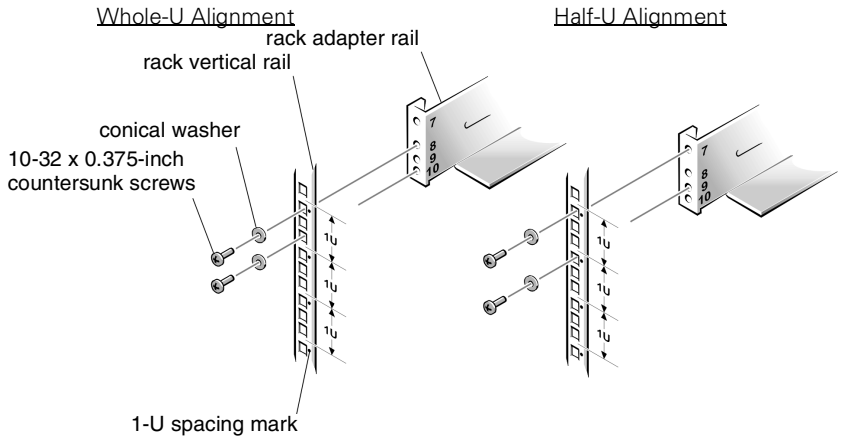


Figure 2-3. Back of Rack Adapter Rail — Whole-U and Half-U Alignment

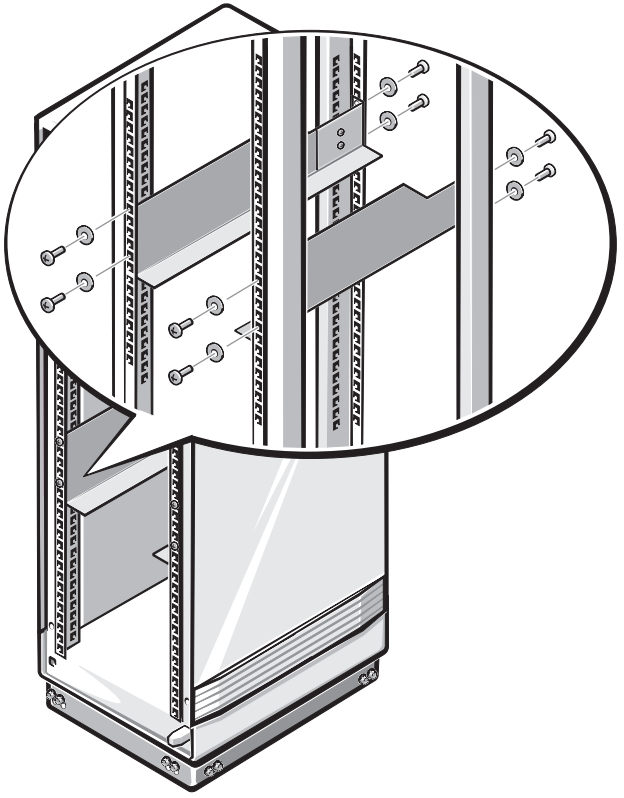


Figure 2-4. Installing Rack Adapter Rails

Installing the Filer in the Rack

To install the filer after the rack adapter rails are installed inside the rack, perform the following steps:

1. Using two or more persons, lift the filer into position at the front of the rack.
2. With one person on each side of the cabinet to support it, lower the filer onto the rack adapter rails.
3. Slide the filer into its mounting position with the front mounting brackets flush against the vertical rails.
4. With the front mounting brackets aligned with the holes on the left and right vertical rails, use a #2 Phillips screwdriver to tighten the thumbscrew on each side.
5. Using a torque wrench with a #2 Phillips bit, torque each screw to 27 inch-pounds (3.0 newton-meters).

Installing the Filler Panel

The half-U filler panel provides the proper spacing between the installed filer and other equipment installed in the rack, such as the PowerVault 700N storage system or a tape backup device. Mounting hardware for the filler panel consists of two 10-32 x 0.625-inch screws and two 10-32 cage nuts.

Perform the following steps to install the cage nuts and install the filler panel:

1. Locate the filler panel and position it in the rack, above and flush against the top of the filer. See if the holes align with the mounting holes in the vertical rails. Invert the filler panel, if necessary, for optimum fastener hole alignment. Make a note of the mounting holes in the vertical rail in which you must install the cage nuts.

   By installing the filler panel one way or the other (inverted), you can achieve the proper fit, whether the filer occupies whole-unit or half-unit rack positions.
2. Insert the lower lip of the cage nut over the bottom of the opening in the back of a vertical rail as shown in Figure 2-5. Then insert the small end of the cage-nut installation tool (provided in the rack mounting kit) through the opening in the rail (from the front), and hook the tool over the top lip of the cage nut.
3. Push in on the cage nut while rotating the tool up and pulling the tool back toward you until the top lip of the cage nut snaps into position.
4. Repeat this process to install the other cage nut on the opposite side of the vertical rail.

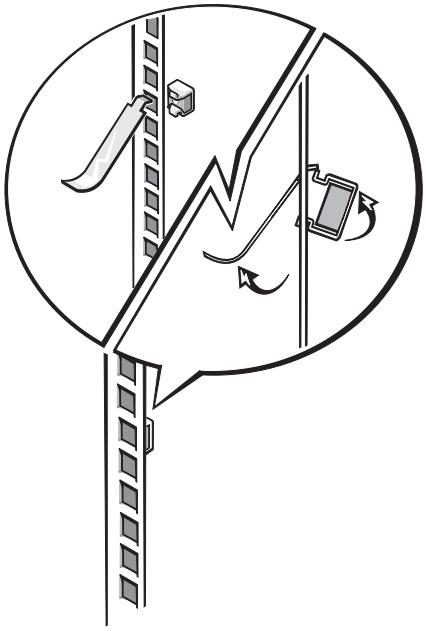


Figure 2-5. Installing a Cage Nut

5. Install the half-U filler panel (provided with the rack mounting kit) above the filer and tighten its screws.

   Your installed filer should look similar to Figure 2-6.

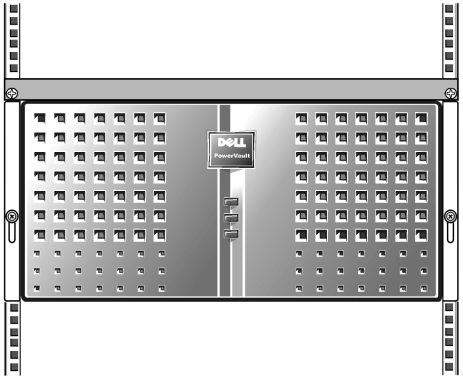


Figure 2-6. Filer Installed in a Rack

Installing the Cable Management Clip

A cable management kit is provided with the filer. This kit consists of a large plastic cable management clip and two self-tapping screws. When properly installed, cables are routed from the back of the filer, through the circular loop of the plastic cable management clip, to the PowerVault 700N storage system, network receptacle, or to the tape backup device.

Cables routed through the cable management clip represent a service loop at the back of the filer. When a trained service technician needs to perform service inside the filer, the cable management clip is opened and the cables are released from the clip. The technician opens the drawer on the back of the filer without putting unnecessary tension on installed cable connections.

1. At the back and to the side of the rack, locate a mounting location for the plastic cable management clip on the left or right vertical rack supports, two to four inches above the back of the filer.

   The clip must be oriented so that the latch is at the top of the clip.

   Your installation may look similar to Figure 2-7.

   Depending on the rack you are using, you may have to first drill a pilot hole for the self-tapping screws.

CAUTION: Do not install the cable clip directly behind the filer or you cannot open the drawer.

2. Using a nut driver or wrench, install the self-tapping screws through the mounting holes at the location you have selected.

   Ensure that the cable management clip is easily opened and closed.

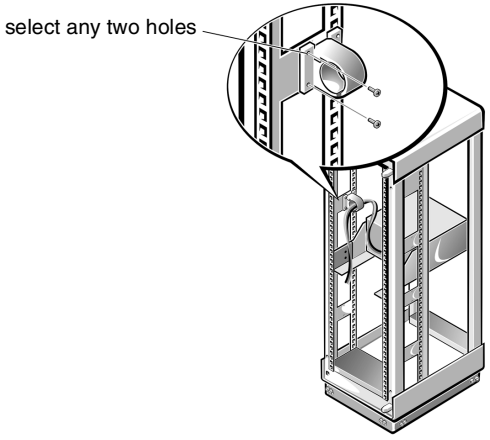


Figure 2-7. Cable Management Clip Installed

3. Later, as you install and connect cables to the back of the filer, route the cables through the cable management clip to the appropriate connector.

Connecting the Filer to a PowerVault 700N Storage System

To connect the filer to a single PowerVault 700N storage system (or to as many as eight PowerVault 700N storage systems when cabled as a daisy-chain) you use the filer's built-in FC-AL (DB-9) interface.

To connect a second or third loop of Fibre Channel PowerVault 700N storage systems to the 740N or 760N filer, you need an FC-AL adapter card installed in the filer for each additional loop. If you order the adapter after your initial order, you must install it yourself.

How to Connect the First Fibre Channel PowerVault 700N Storage System

To connect the filer to the first PowerVault 700N storage system (in a single FC-AL loop), perform the following steps:

NOTE: This procedure assumes the PowerVault 700N storage system has been installed in the rack above or beneath the filer, following the installation instructions provided with the equipment.

1. Connect the FC-AL filer-to-PowerVault 700N storage system cable to the PRI connector on the link control card (LCC) back panel on the PowerVault 700N storage system (see Figure 2-8). Tighten the locking screws on the cable's DB-9 connector.

   For a daisy-chain configuration, make sure that the ID on the PowerVault 700N storage system connected to the filer is set to 0.

2. Route the cable through the cable management loop and then to the FC-AL0 connector on the back of the filer.

3. Install the free end of the cable's DB-9 connector to the filer's DB-9 socket connector, labeled FC-AL0. This first Fibre Channel loop is designated loop 0. This connector is located at the lower right corner of the filer's back panel. Tighten the locking screws on the cable's DB-9 connector.

Figure 2-8 shows the completed connections to the first PowerVault 700N storage system.

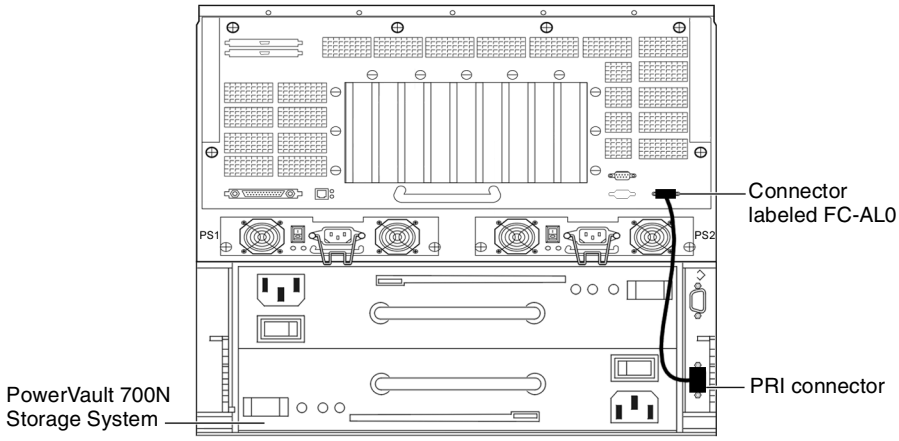


Figure 2-8. Filer Connections To the First PowerVault 700N Storage System

Connecting a Second or Third Loop of PowerVault 700N Storage Systems

The 740N and 760N support two and three loops of PowerVault 700N storage systems, respectively (each cabled in its own FC-AL loop). Connecting more than one loop enables you to spread the storage load. You must observe the 1.0 TB and 1.5 TB storage limit for the 740N and 760N, respectively.

You connected the first loop of PowerVault 700N storage system(s) to the filer's built-in FC-AL interface (FC-AL0). You need an FC-AL adapter installed in the filer for each additional loop of PowerVault 700N storage system(s). The PowerVault 700N storage system(s) in each loop are numbered from 0 to 7.

To connect the filer to a second and third loop of PowerVault 700N storage system(s), perform the following steps:

1. Ensure that you have an FC-AL adapter card installed in the filer for each additional loop to which you wish to attach PowerVault 700N storage system(s). The PowerVault 700N storage system(s) in each loop are numbered from 0 to 7.

The second FC-AL adapter card

If you ordered optional FC-AL adapters for your 740N or 760N filer during initial purchase, they are installed in the filer when you receive it. You need to install it yourself if you order it at a later time. Refer to "Slot Assignments," in Chapter 1, to learn the correct slot number on the 740N and 760N, respectively.

2. Connect one end of the FC-AL filer-to-PowerVault 700N storage system cable to the PowerVault 700N storage system's LCC module. Connect to the PRI connector (the LCC module's lower connector) on the PowerVault 700N storage system 0 in FC-AL loop 1.

3. Route the cable through the cable management loop and then to the FC-AL adapter card in slot 7.

4. Connect the free end of the FC-AL filer-to-PowerVault 700N storage system cable to the filer's FC-AL adapter card connector in slot 7 (see Figure 2-9). Tighten the locking screws on the cable's DB-9 connector.

   In Figure 2-9, the first loop is connected to the FC-AL0 interface of an 760N. The second loop is connected to the FC-AL adapter in slot 7 on the 740N or 760N filer.

5. Connect successive PowerVault 700N storage systems by connecting short DB9-to-DB9 jumpers from the first PowerVault 700N storage system EXP connector to the next-higher (or next lower) PowerVault 700N storage system PRI connector installed in the rack. Repeat this for each PowerVault 700N storage system in each loop.

   The configuration in Figure 2-9 has eight PowerVault 700N storage systems. Such a configuration must be installed in a rack, preferably with the filer located in the middle of the rack and four PowerVault 700N storage systems above and four below the filer. A rack is not shown in the illustration.

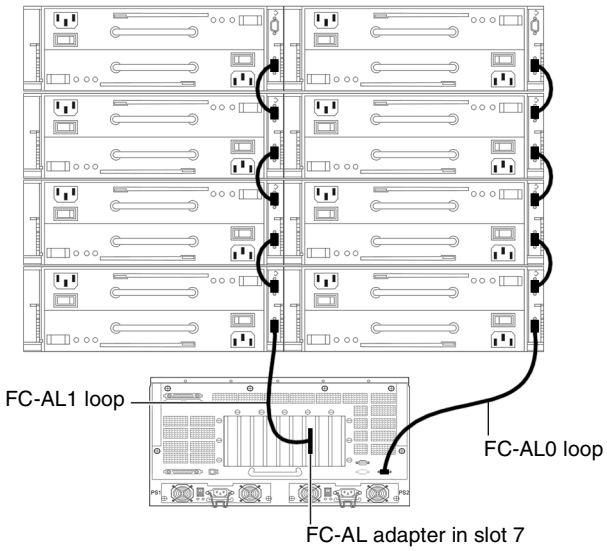


Figure 2-9. Two FC-AL Connections to Multiple PowerVault 700N Storage Systems

The third FC-AL loop (loop 2) would be connected using this procedure, but using the FC-AL adapter card in slot 6 for the 740N filer, or using the FC-AL adapter card in slot 4 for the 760N filer.

Connecting the Filer to a Tape Backup Device

The Built-In SCSI Interface Is for Backup

The filer has a built-in wide differential SCSI tape interface for connecting an external tape backup device.

This SCSI tape interface accepts a standard 68-pin SCSI cable with a maximum length of 17 feet (5 meters).

How to Connect the Filer to a Tape Backup Device

To install the tape backup device, refer to the documentation shipped with the tape device.

To connect the filer to a tape device, perform the following steps:

1. Ensure that the filer is shut down, power is switched off, and the power cords are disconnected from AC power.

   If it is not, execute the `halt` command, then turn off the power on the power supply.

   If the filer has two power supplies, turn off both power supplies.

2. Set the SCSI ID on the tape backup device

   Refer to the documentation for the tape backup device.

3. If you have a robotic loader on the tape backup device, set its SCSI ID also.

4. Turn off the power on the tape backup device.

CAUTION: The power must always be off on the tape device when you connect it to or disconnect it from the filer. It it is not, you might damage the filer's SCSI controller.

5. Connect the SCSI cable to the SCSI connector on the tape device and the built-in SCSI connector on the filer, labeled SCSI TAPE.

   Use the SCSI cable provided with the tape backup device.

CAUTION: Do not use any other SCSI connector on the filer.

6. Terminate the SCSI bus at the tape backup device.

   Use an active SCSI terminator.

   For information about terminating the SCSI bus, refer to the documentation for your tape backup device.

Figure 2-10 shows a SCSI cable connected to the tape backup device and to the connector, labeled SCSI TAPE.

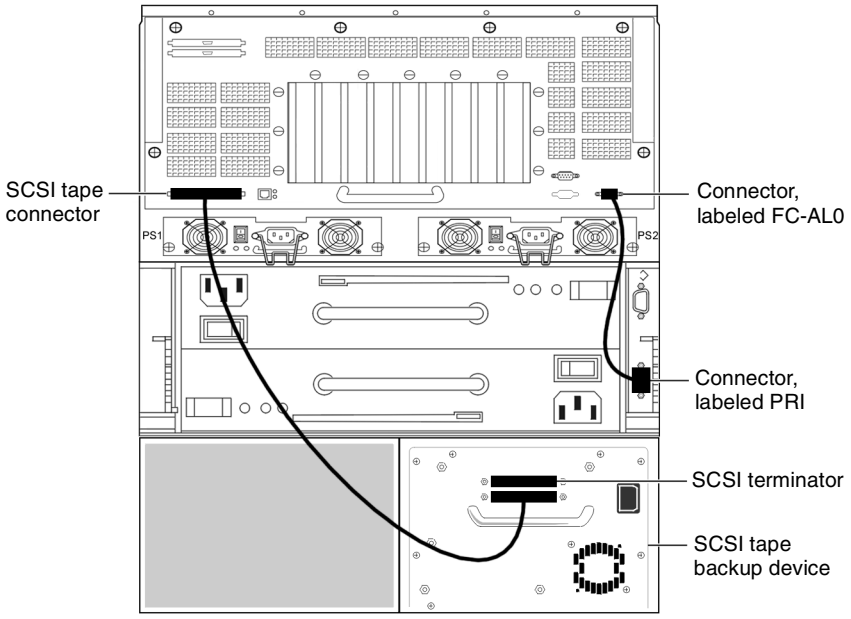


Figure 2-10. SCSI Connections to Tape Backup Device

Connecting the Filer to the Network

Available Network Connections

You can connect the filer to multiple networks.

This section describes how to connect your filer to an Ethernet network.

During your initial purchase, you order the NICs you need. The filer is shipped with the NICs installed. You can also order additional NICs later.

The NICs' connectors fit through the slot openings in the filer's back panel.

Table 2-5 lists all available network connectivity.

Table 2-5. Network Connectivity

Standard Network Connectivity	Optional Network Connectivity
Built-in 10/100Base-T Ethernet	• Additional 10/100Base-T Ethernet • GB (1000Base-T) Ethernet

Connecting to an Ethernet Network

The filer supports three types of Ethernet NICs: a single-port 10/100Base-T, a quad-port 10/100Base-T, and a GB Ethernet.

Ethernet Cabling Requirements

Table 2-6 lists the cabling requirements for Ethernet connections.

Table 2-6. Ethernet Cabling Requirements

Ethernet Connector	Cabling Requirements
10Base-T	Category 3 or 5 unshielded twisted-pair (UTP) cable.*
100Base-TX	Category 5 UTP cable.*
GB Ethernet	Fiber cable.

**Do not exceed the maximum cable length specification.*

How to Connect the Filer to a 10/100Base-T Ethernet Network

To connect the filer to a 10/100Base-T Ethernet network, perform the following step:

1. Push the twisted-pair cable connector into the filer's built-in RJ-45 connector, labeled 10/100Base-T, until it clicks and locks into place.

   Use Category 3 (10Base-T only) or Category 5 (10/100Base-T) unshielded twisted-pair (UTP) cable.

Figure 2-11 shows the built-in Ethernet connector.

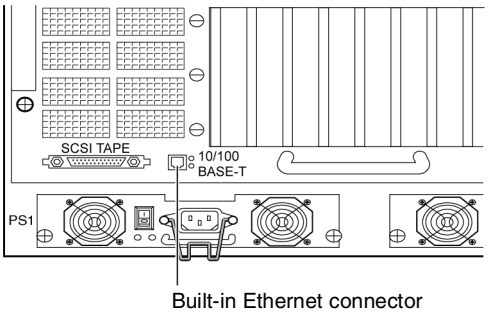


Figure 2-11. Built-In Ethernet Connector Location

How to Connect the Filer to Other Ethernet Networks

To connect the filer to other Ethernet networks, follow this step.

1. Connect the appropriate cable to the Ethernet network interface controller (NIC) connector.

   Figure 2-12 shows two quad-port 10/100Base-T cards in slots 1 and 2 and one single-port card in slot 3.

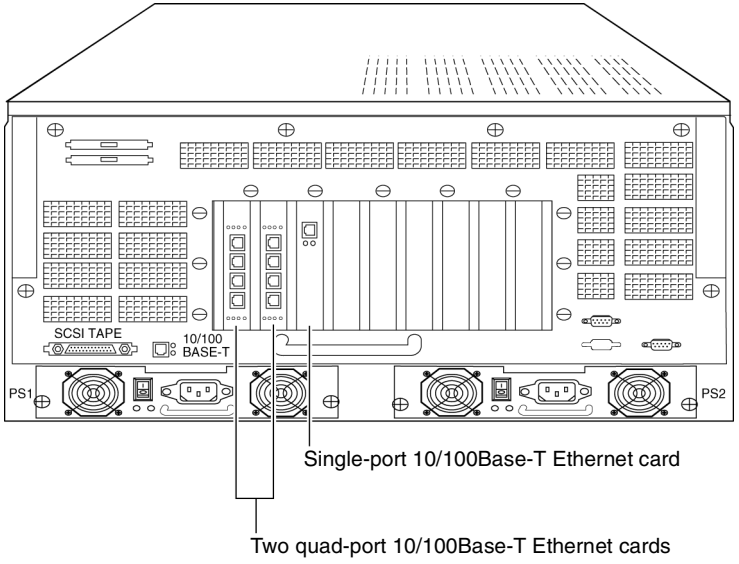


Figure 2-12. Ethernet Network Interface Controllers

Establishing a Terminal Connection to the Filer

After the Filer Is Connected to the Network

At this point, the filer, PowerVault 700N storage system, and tape backup device are connected and the filer is connected to the network.

You are ready to power on the system. Before you do so, it is a good idea to establish a terminal connection to the filer so that you can observe the system responses on the terminal screen when the system is started. You also need a terminal to set up the filer after you start it.

Connecting an ASCII Terminal

You can establish a connection to the filer from an ASCII terminal, serial concentrator, or communications server.

This section describes how to connect an ASCII terminal (also referred to as an *ANSI terminal*) to the filer and how to verify the filer and PowerVault 700N storage system installations.

Cable Requirements

A DB-9–to–DB-9 straight-through serial cable for an ASCII terminal connection is provided with your filer. If this cable is not compatible with your terminal connector, use a null modem cable.

The filer's DB-9 serial port supports only DTE devices, not DCE devices such as modems. Most terminals are wired as DTE devices.

NOTE: To use a serial concentrator or communications server, refer to the documentation for those devices.

CONSOLE Port Pin Settings

The following table lists the pin settings for the DB-9 CONSOLE port.

Table 2-7. Serial Console Connector Assignments

DB-9 Pin	Function	DB-9 Pin	Function
1	Data Carrier Detect	5	Ground
2	Receive Data	6	Data Set Ready
3	Transmit Data	7	Request to Send
4	Data Transmit Ready	8	Clear to Send

How to Connect an ASCII Terminal to the Filer

To connect an ASCII terminal to the filer, perform the following steps:

1. Ensure that the terminal settings match the filer's, listed in Table 2-8.

Table 2-8. Serial Console Default Communications Settings

Parameter	Setting
Line speed	9600 baud
Data bits per character	8
Parity	None
Stop Bits	1
Flow Control	None

Refer to the documentation for your terminal for further details.

CAUTION: The terminal does not work properly if its settings do not match.

2. Connect the cable's socket end to the filer's plug connector, labeled CONSOLE.

   Use the provided DB-9–to–DB-9 serial cable.

Figure 2-13 shows the location of the CONSOLE port.

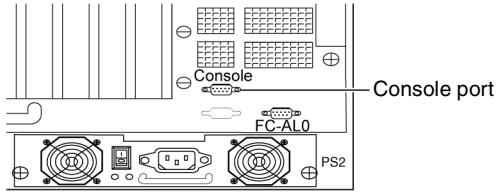


Figure 2-13. Filer Console Port Location

About Connecting From a Remote Site

If you are connecting an ASCII terminal from a remote site, be sure that you do not have a local terminal connected to the filer's CONSOLE port.

Connecting the System to a Power Source

Turning on All Units in the System

You turn on power on to the units in the system in this order:

- PowerVault 700N storage systems and tape backup device (any order)
- PowerVault 720N, 740N or 760N filer last

CAUTION: It is important that the filer is the last unit that you power on.

The PowerVault 700N storage system and disk drives require time to power on, reset, and prepare to respond to the filer. The filer expects them to be ready for input/output when it is turned on and performs its reset and self-test.

The turn-on process automatically:

- Checks all connections to the filer
- Starts the `setup` program

This section uses a system with three units as an example—filer, PowerVault 700N storage system, and tape backup device. Assume that you have these three units installed and connected in a rack and are ready to turn them on.

How to Turn on the PowerVault 700N Storage System and Tape Backup Device

To turn on the PowerVault 700N storage system and tape backup device, refer to the documentation for those products.

Do not proceed if the PowerVault 700N storage system(s) or the tape backup device fail to power up. Recheck all connections and the power source, and then retry.

How to Turn on the Filer

To connect the filer to a power source, perform the following steps:

1. Ensure that the power switch on each power supply is in the Off position.
2. Connect the socket end of the power cord to the recessed power plug on the power supply.
3. Secure the AC cord with the retaining clip.

Figure 2-14 shows two power supplies.

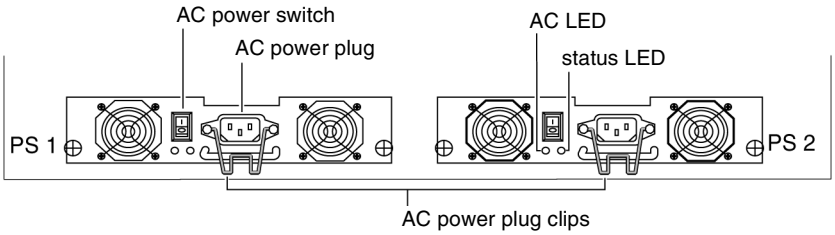


Figure 2-14. Filer Power Supplies

4. Plug the other end of the power cord into a grounded electrical outlet.
5. Repeat Steps 1 through 4 for the second power supply.
6. Turn the power switch on the power supplies to the On position.

   The system verifies the filer hardware and loads the operating system.
7. Ensure that the LEDs on the front panel and the AC LED on the power supplies illuminate.

   LEDs on front panel

   Power Turns green.
   StatusTurns yellow, then turns off when the filer starts.

   AC LED on power supply

   Yellow First turns yellow to indicate that AC power is present.
   GreenThen turns green to indicate that all outputs are good.

   If the LEDs do not light, check your connections and the power source, and retry.
8. Check the startup messages as they appear on the console or LCD.

   At the end of the initial startup, the default host name prompt *filer>* appears on the console screen.

   The startup messages appearing on the LCD display are described in "LCD Messages," in Chapter 3.

   The filer is ready to be configured.
9. Proceed to the *User's Guide*.

CHAPTER 3
Troubleshooting the Filer Hardware

Using LED Indicators and LCD Messages

What This Chapter Covers

This chapter provides information about how to troubleshoot the PowerVault 720N, 740N, or 760N hardware based on the filer's light-emitting diode (LED) status indicators and system error messages displayed on the liquid crystal display (LCD) panel. It also describes the startup messages that appear when you first start up the system.

WARNING: The power supplies in this filer produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to open the filer panels or drawers and access any of the components inside the filer.

CAUTION: Some corrective actions require a Dell trained service provider to open the system chassis, reseat expansion cards, or replace hardware components, using service documentation.

What This Chapter Does Not Cover

This chapter does not describe the specific steps necessary to replace expansion cards or internal components of the filer. Refer all servicing of components inside the filer to trained service technicians.

This chapter does not describe system problems related to software configuration, NFS, CIFS, or HTTP. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about troubleshooting software problems.

How the LEDs and LCD Work

The LEDs and LCD are controlled by a built-in environmental controller sensor on the system board that functions as the interface between them and the processor. This controller/sensor monitors environmental conditions, such as the temperature and fan status, and displays signals on the LEDs and messages on the LCD.

Should any corrective action be required, the LCD displays a message. Refer to "LCD Messages" to determine what corrective action is required for a particular message.

LEDs on the Front and Back Panels

Front Panel LEDs

Figure 3-1 shows the LEDs on the front panel.

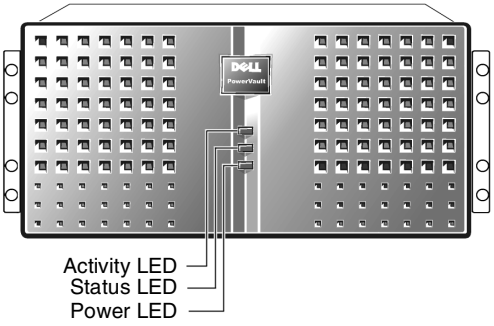


Figure 3-1. Front Panel LEDs

Table 3-1 describes the three LED codes on the front panel.

Table 3-1. Front Panel LED Code Description

LEDs	State	Indicates
Activity	Green	Operation/activity is normal.
	Flashing	CPU or network activity detected.
	Off	No activity detected.
Status	Green	The system is operating normally.
	Yellow	A fault has occurred or the system has halted. The system requires service. Refer to the LCD message for a description of the system problem. The LCD message `STDBY/SERV` means the filer is in standby mode—a product feature to be implemented in a future software release. *The Status LED turns yellow when you turn on the filer and stays lit while the operating system is loading. It turns off when the filer starts.*
Power	Green	On—The system is on. Off—The system is down.

Back Panel LEDs

Power Supply LEDs

Figure 3-2 shows the power supply LEDs.

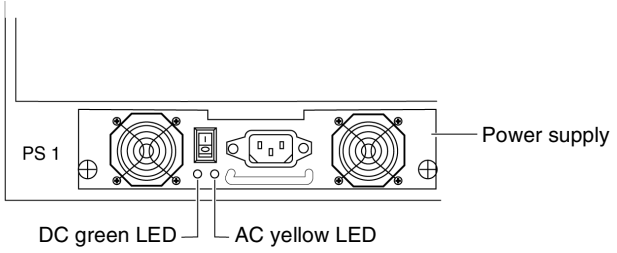


Figure 3-2. Filer Back Panel — Power Supply LEDs

Table 3-2 describes the power supply LED codes on the back panel.

Table 3-2. Front Panel LED Code Description

LEDs	State	Indicates
DC	Green	On — DC power is good. Off — DC output power is not good. If the DC green LED is off, contact a service technician to replace the power supply. If one power supply fails, the message, `Power supply degraded . . .` appears on the LCD. A similar message appears on the system console telling you which power supply failed. The message, `Power good`, also appears on the LCD and console, indicating that the second power supply is maintaining the filer.
AC	Yellow	On—AC signal is good. Off—AC signal is not good. If the AC LED is off but the power LED on the front panel is on, the second power supply takes over and maintains the filer. In either case: • Ensure that the power supply is fully installed and locked into place. • Ensure that the power switch is in the On position. • Check the power source. • If the preceding actions do not correct the problem, contact Dell technical support for help.

Built-In Ethernet Connector LEDs

The built-in 10/100BASE-T Ethernet connector has two LEDs, as shown in Figure 3-3.

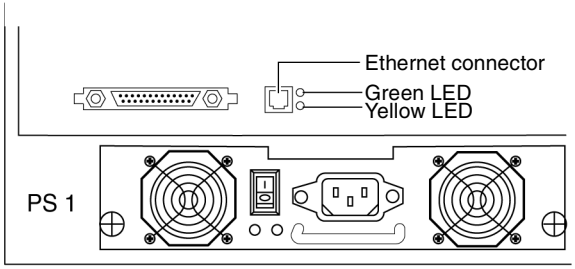


Figure 3-3. Built-In Ethernet LEDs

Table 3-3 describes the LEDs for the built-in 10/100BASE-T Ethernet connector.

Table 3-3. Built-In Ethernet LED Code Description

LEDs	State	Indicates
Top	Green	On—Ethernet connection is ready.
		Off—No Ethernet connection is present.
Bottom	Yellow	On—Traffic is passing on the network.
		Off—No traffic on the network.

LEDs on the Ethernet Network Cards

Single-Port and Quad-Port Ethernet Card LEDs

The filer supports a single-port 10/100BASE-T and a quad-port 10/100BASE-T Ethernet card.

Single-Port 10/100BASE-T Card LEDs

The single-port 10/100BASE-T Ethernet card has one connector and two LEDs, as shown in Figure 3-4.

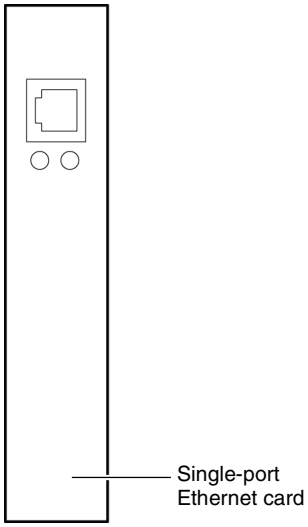


Figure 3-4. LEDs on the Single-Port Ethernet Card

Table 3-4 describes the LEDs on the single-port Ethernet card.

Table 3-4. Single-Port Ethernet Card LED Code Description

LEDs	State	Indicates
Left	Yellow	On—Traffic is flowing through the card.
		Off—No traffic is present.
Right	Green	On—Link to the network is valid.
		Off—No link to the network is present.

Quad-Port 10/100BASE-T Card LEDs

The quad-port Ethernet card has four connectors for four channels, with the top connector assigned to the first channel. Each connector has a corresponding yellow and green LED.

The four LEDs at the top are for the first and second channel. The four LEDs at the bottom are for the third and fourth channel, as shown in Figure 3-5.

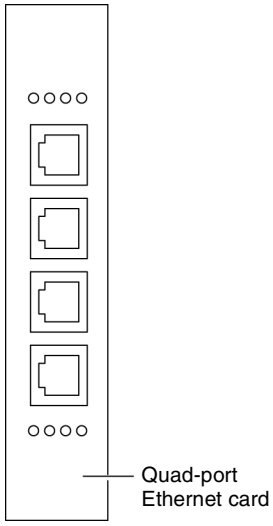


Figure 3-5. LEDs on the Quad-Port Ethernet Card

Table 3-5 describes the pair of yellow and green LEDs for a single channel.

Table 3-5. Quad-Port Ethernet Card LED Code Description

LEDs	State	Indicates
First or Third	Yellow	On—Traffic is flowing through the card.
		Off—No traffic is present.
Second or Fourth	Green	On—The link to the network is valid.
		Off—No link to the network is present.

GB Ethernet Card LEDs

The GB Ethernet card has one fibre-optic connector and two LEDs, as shown in Figure 3-6.

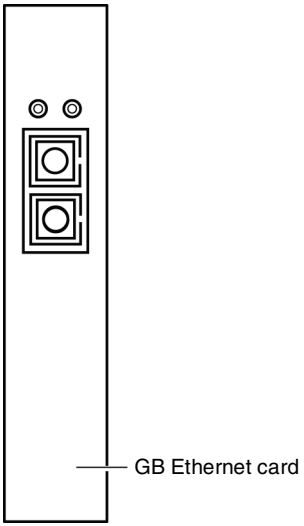


Figure 3-6. LEDs on the Gigabit Ethernet Card

Table 3-6. Gigabit Ethernet Card — LED Code Description

LEDs	State	Indicates
Network activity	Yellow	On—The network is active
		Off—The network is not active
Link status	Green	On—The link is operating properly
		Off—The link has failed

About the Built-In SCSI Tape Adapter

The filer has a single-port, wide differential SCSI adapter for tape backup on the back panel. This adapter has no LEDS.

LCD Messages

Types of LCD Messages

The system reports its status, error, and diagnostic messages on the LCD and system console.

Most LCD messages are truncated versions of console messages that provide more information about the error condition than the LCD messages.

Table 3-7 lists the four types of LCD messages:

Table 3-7. Types of LCD Messages

Type of LCD Message	Description
Startup messages	Indicate the results of the POSTs (power-on self-tests) and the status of the boot process.
Error messages at startup	Appear when the system is starting.
Informational or error messages	Appear when the system is operating.
Error messages when halting	Show the system has halted or is restarting because of system problems.

About This Section

This section identifies and describes the different types of messages on the LCD and suggests corrective actions for problems associated with the message.

Some of the corrective actions require you to contact a service technician to replace hardware components.

The system console messages are logged to /etc/messages. If you contact Dell technical support for service, report both the LCD and the console message.

Startup Messages

When the system is powered on, it verifies the hardware, loads the operating system, and displays the startup messages on the LCD and console, if the console is connected.

When Starting Up From a System Boot Diskette

If you are starting the system from a system boot diskette, the system does not display the system prompt after it is started. Instead, it asks you for input. The LCD displays the following message: Waiting for user input.

For more information about starting the system boot diskette, refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* .

Types of Startup Messages

Table 3-8 lists the two types of startup messages.

Table 3-8. Types of Startup Messages

Startup Message	When They Appear
POST messages	Immediately after you power on the filer.
Boot messages	When the filer is loading the operating system.

POST Messages

When you turn on the power, the filer checks the hardware on the system board by running a series of POST tests from a PROM (Programmable Read-Only Memory).

The following list is a sample of messages that appear on the system console when the POST tests are running. The exact messages that appear on your system console depend on your system configuration.

```
Alpha Open Firmware by FirmWorks

Copyright 1995-1998 FirmWorks, Network Appliance.  All
Rights Reserved.

Firmware release 2.0_a2

Memory size is 512 MB

Testing SIO

Testing LCD

Probing devices

Testing 512MB

Complete

Finding image...

Starting
```

If you do not have a system console connected to the filer, you can observe the POST messages on the LCD.

Sample POST Messages on the LCD

The following list is a sample of POST messages that appear on the LCD:

```
Checking sensors

Testing clock

Testing floppy

Testing watchdog

Testing 256MB

Complete

Probing devices
```

POST Error Message on the LCD

The following list gives the possible error messages on the LCD if the filer encounters errors during the POST tests.

```
Startup failed

ok>
```

If this error message appears, contact Dell technical support. The `ok>` prompt accepts debugging commands, which are reserved for authorized service personnel only.

```
*SIO error*FLPY seek err

*Watchdog failed*FLPY track err

*L2 parity error*FLPY head err

*Fan(s) stopped*FLPY format err

*CPU fan stopped*FLPY read error

*Overtemp alert*FLPY setup err

*PS #1 failed*LCD won't open

*PS #2 failed*LCD cmd stall

*No power info!*LCD cursor err

*Clock bogus. Date reset*LCD data error

*Env-A stat err*Clock error

*Env-B stat err*Clock dead

*Env-C stat err*Clock reset

*Env-A rupt err
```

```
*Env-B rupt err

*Env-C rupt err

*FP button stuck

*FLPY init fail

*FLPY reg error
```

Boot Messages

If the hardware passes all POST tests, the filer begins to load the filer software and display informational boot messages.

Figure 3-7 shows a sample message that appears on the system console when the filer is successfully started. The exact boot messages that appear on your system console depend on your system configuration.

If you are starting the system from a system boot diskette, some messages might be different from the following messages. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about how the filer is started from a system boot diskette.

```
NetApp Release 5.3: Fri Apr 23 14:57: 51 CDST 1999

System ID: 0016788685 ()
slot 0: System Board
        Memory Size:        512 MB
slot 0: Fibre Channel adapter
        Version 1.12
        Host Loop Id 119
        Cacheline size 8        FC Packet size 2048
        3 Disks:             25.8GB
        1 shelf with DISK ENCLOSURE
        SCSI Host Adapter 0b
slot 0: Ethernet Controller e0
        MAC Address: 00:a0:98:00:3b:71 (auto-100tx-fd-
up)
slot 3: Ethernet Controller e3
        MAC Address:        00:a0:92:f7:62:56 (tp-down)
slot 9: NVRAM
         Memory Size:        32 MB

Please enter the new hostname [ ]:
```

Figure 3-7. Boot Messages

Error Messages at Startup

Table 3-9 lists LCD error messages that the system detects when starting.

Table 3-9. Startup Error Messages

Error Message	Description
Add at least *x*MB more memory	*x*—The amount of memory you need to add to the system. The system has too little memory for the amount of disk space installed.
Cannot initialize labels	When it tries to create a new file system, the system cannot initialize the disk labels.
Cannot read labels	This error occurs only when the filer tries to initialize a new file system. The message indicates that the filer has a problem reading disk labels it wrote to the disks. This error occurs because • The system fails to read the size of a disk. • The written disk labels were not valid.
Can't open */etc/rc*	The */etc/rc* file is corrupted. Run `setup` by entering **`setup`** at the `hostname>` prompt. The `setup` program prompts you to enter the necessary system configuration information. For more information about the filer `setup` program, refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide*.
Dirty shutdown in degraded mode	The file system might be inconsistent because you did not shut down the system cleanly when it was in degraded mode.
Configuration exceeds max PCI space	Memory space for mapping in PCI cards has been exhausted. Make sure that all expansion cards in the filer are supported cards.
Disk labels scrambled!	The disk labels are corrupted.

Table 3-9. Startup Error Messages *(continued)*

Error Message	Description
Drive *m.n* not supported	*m*—The disk number; *n*—the disk ID number. The system detects a disk or tape drive that is not supported by Dell.
EMU rev x not qualified	The EMU revision level is not recognized.
Drive placement ha *x* shelf *y*	ha—host adapter, *x*— host adapter number, *y*—disk shelf number (PowerVault 700 storage enclosure address number). The specified drives are incorrectly placed in the PowerVault 700N storage system. For more information, refer to the manual for the PowerVault 700N storage system.
EMU *y* not supported	The EMU firmware revision or part number is not valid.
File system may be scrambled	One of the following errors causes the file system to be inconsistent: • An unclean shutdown when the filer is in degraded mode and when NVRAM is not working. • The number of disks detected in the disk array is different from the number of disks recorded in the disk labels. The system cannot start when more than one disk is missing. • The system encounters a read error while reconstructing parity. • A disk failed at the same time as the system crashed.
Invalid PCI card slot *n*	*n*—The card's expansion slot number. The system detects an expansion card that is not supported by Dell.

Table 3-9. Startup Error Messages *(continued)*

Error Message	Description
No disks!	The system can detect FC-AL controllers but not the disks. Verify that • All disks are installed properly in the PowerVault 700N storage system. • If multiple PowerVault 700N storage systems are connected in a loop, ensure that a terminator is installed on the last PowerVault 700N storage system. Also ensure that all FC-AL connections are secure. If the problem persists, use another FC-AL cable, then power-cycle (turn the power off, then on again) the PowerVault 700N storage system and the FC-AL adapter card.
No */etc/rc*, running setup	The system cannot find the */etc/rc* file. It automatically starts `setup` and prompts you to enter the necessary system configuration information. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for more information about filer `setup`.
No network interfaces!	The system cannot detect any network interfaces. Turn off the system and verify that all network cards are seated properly in the appropriate expansion slots.
No NVRAM present	The system cannot detect the NVRAM card. Make sure that the NVRAM card is securely installed in expansion slot 9.
No FC-AL or SCSI disk controllers!	The system cannot detect any FC-AL or SCSI controllers. Turn off the power on the filer and verify that all network cards are in their proper expansion slots.
No SES on shelf *x* ha *y*	ha—host adapter. Occurs if the Enclosure Services in the FC-AL drive racks have not initialized or have problems.
NVRAM #*n* downrev!	*n*—The serial number of the NVRAM card. The NVRAM card is an early revision that cannot be used with the system.

Table 3-9. Startup Error Messages *(continued)*

Error Message	Description
NVRAM test failed	The system NVRAM produces an error when the system is starting.
Replace NVRAM batteries!	The system is in degraded mode and both batteries on the NVRAM card are low or discharged. Replace both batteries immediately.
Unsupported NVRAM size *x*MB	*x*—The amount of memory on the NVRAM card. The specified size is not supported.
Unsupported SES shelf *x*, ha *y*	ha—host adapter. The system detects unsupported Enclosure Services hardware.

Informational or Error Messages

After the system has started, the LCD displays a number followed by a bar graph to indicate how many operations per second the system has processed.

If the system is not operating correctly, the LCD displays one of the following messages. Some of the errors described also cause the service LED on the system front panel to illuminate.

Table 3-10. Informational or Error Messages

Error Message	Description
CIFS service disabled!	This message appears only if you have licensed CIFS. One of the following errors causes CIFS service to fail: • The filer's */etc/passwd* and */etc/group* files are missing. To learn how to create a new filer, refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide*. • The filer failed to register its WINS host name and workgroup name with the WINS server. Using the `cifs setup` command, enter the host name and workgroup name. • The WINS server has a problem. Refer to the documentation for your WINS server for information about troubleshooting the server.
Data disk *n x*% rebuilt	*n*—The RAID group disk number; *x*—amount of data reconstruction completed. This shows how much data reconstruction has been completed on the spare disk after the system entered degraded mode. If an error occurs when the reconstruction is in progress, the error message overrides this message. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about how to locate a disk based on the RAID group disk number.
Disk *n* is broken	*n*—The RAID group disk number. The solution depends on whether you have a hot spare installed in the system. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about how to locate a disk based on the RAID group disk number and how to replace a faulty disk.

Table 3-10. Informational or Error Messages *(continued)*

Error Message	Description
Fans stopped; replace them!	This message appears if the fan assembly of the filer stops functioning. Replace the fan assembly as soon as possible.
Fault on shelf *n*	*n*—The PowerVault 700N storage system enclosure address number. This message appears when the system detects an error on one or more Dell PowerVault 700N storage systems. Check the LEDs of the specified Dell PowerVault 700N storage systems to see whether a fan or power supply needs to be replaced. Replace the faulty fan or power supply on the Dell Power-Vault 700N storage system, if needed.
Maintenance mode	The system is running in maintenance mode. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for more information about maintenance mode.
Non Maskable interrupt	This message is usually generated by a correctable (nonfatal) memory error, but might signal other conditions. If this message appears repeatedly, it might indicate a defective memory module (DIMM). Refer to the console messages or to the */etc/messages* file for detailed information.
NFS service not enabled	This message appears only if you have licensed NFS. NFS service has been disabled either because the system failed to enable it when it started, or because you disabled it with the `nfs off` command.
Parity disk is broken	The parity disk is not operating and the system is in degraded mode. The solution depends on whether a hot spare is installed in the system. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about replacing a faulty disk.

Table 3-10. Informational or Error Messages *(continued)*

Error Message	Description
Parity disk *x*% rebuilt	The system shows the amount of completed data reconstruction on the spare disk after the system entered degraded mode. *x*—Amount of data reconstructed. If an error occurs during reconstruction, the error message overrides this message.
Power supply degraded!	One of the power supply units is down. For more information about this error message, check the messages on the console. The power supply unit (1 or 2) generating the alarm is identified on the console message.
Replace NVRAM batteries!	This message appears in these situations: • An NVRAM card battery is low or discharged. Replace both batteries as soon as possible. • Both batteries on the NVRAM card are low or discharged. The system will shut down every 24 hours to encourage you to replace the batteries as soon as possible. To set the time that the system runs before it automatically shuts down, use the `raid.timeout` option with the `options` command. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for more information. • Both NVRAM card batteries are low or discharged and the system is in degraded mode. The system shuts down immediately.

Table 3-10. Informational or Error Messages *(continued)*

Error Message	Description
Reporting SNMP traps and Setting up SNMP trap host	These messages appear briefly when the filer is reporting to the SNMP management host on SNMP trap conditions. Refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* for information about SNMP administration and setting up SNMP management parameters.
Setting time from remote host	This message appears briefly when the filer is resetting its Time-of-Day Clock from a remote time source. For more information, see the `rdate` command in the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide*.
x default route *x* route to *y*	These messages appear briefly when the routing software is configuring the routing table. For more information, refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide*.

The following SES error messages might also appear during system operation: Drive placement ha *x* shelf *y*, No SES on shelf *x* ha *y*, Unsupported SES shelf *x*, ha *y*.

Error Messages When Halting

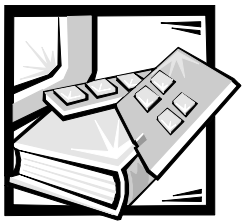
If a system problem has caused the system to halt or restart, the LCD displays one of the system halt messages listed in Table 3-11.

Table 3-11. System Halt Error Messages

Error Message	Description
CPU fan has failed	The filer's CPU fan has stopped functioning. The system automatically shuts down.
Dumping core	The system is dumping core after a system crash. For information about core files, refer to the *Dell PowerVault 720N, 740N, and 760N System Administrator and Command Reference Guide* .
Disk hung during swap!	A disk error occurred as you were hot swapping a disk. To recover, disconnect the Dell PowerVault 700N storage system from the power supply and wait 15 seconds to allow all disks to spin down. Reconnect the power source to the Dell PowerVault 700N storage system and enter **`boot`** to restart the system.
Error dumping core	The system cannot dump core during a system crash; the system restarts without dumping core.
Halted	This message appears after you enter a **`halt`** command or after the system is halted automatically because of a problem. If an error message appears during the restart, follow the instructions suggested in this chapter to fix the problem.
ISA IOCHK	ISA bus failure.
Panicking	The system is crashing. If the system does not hang while crashing, the message, `Dumping core`, appears.
Rebooting	The system is restarting. The boot messages follow.
Replace NVRAM batteries!	Both NVRAM batteries are discharged. The system automatically shuts down.

Table 3-11. System Halt Error Messages *(continued)*

Error Message	Description
System error: errsts *%x*	*%x*—An error code representing a specific error condition. The system detects a hardware error, such as a parity error, that cannot be corrected. To clear the error condition, the system restarts.
System too hot	The temperature sensor indicates that the system temperature is too high.
Uncor proc mchk: code *x*	Processor machine check code.
Uncor sys mchk: code *x*	System machine check code.



CHAPTER 4
Getting Help

This chapter describes the tools Dell provides to help you when you have a problem with your PowerVault 720N, 740N, or 760N filer. It also tells you when and how to call Dell for technical or customer assistance.

Technical Assistance

If you need assistance with a technical problem, perform the following steps:

1. Complete the troubleshooting checks in Chapter 3, "Troubleshooting the Filer Hardware."
2. Make a copy of the Diagnostics Checklist (found later in this chapter), and fill it out.
3. Use Dell's extensive suite of online services available at Dell's World Wide Web site (**http://www.dell.com**) for help with installation and troubleshooting procedures.

   For more information, refer to "World Wide Web on the Internet" found later in this chapter.
4. If the preceding steps have not resolved the problem and you need to talk to a Dell technician, call Dell's technical support service.

   When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

   NOTE: Dell's Express Service Code system may not be available in all countries.

   For instructions on using the technical support service, refer to "Technical Support Service" and "Before You Call" found later in this chapter.

Help Tools

Dell provides a number of tools to assist you. These tools are described in the following sections.

NOTE: Some of the following tools are not always available in all locations outside the continental U.S. Please call your local Dell representative for information on availability.

World Wide Web

The Internet is your most powerful tool for obtaining information about your filer and other Dell products. Through the Internet, you can access most of the services described in this chapter, including AutoTech, TechFax, order status, technical support, and product information.

From Dell's World Wide Web home page (**http://www.dell.com**), click the **Support** icon, and click **Support Your Dell**. Enter your service tag number (or, if you have one, your Express Service Code) and click **Submit**. If you don't have your service tag or Express Service Code available, you can also select support information by system.

Everything you need to know about your system is presented on the system support page, including the following tools and information:

- Technical information — Details on every aspect of your system, including hardware specifications.
- Self-diagnostic tool — A system-specific troubleshooting application for resolving many computer-related issues by following interactive flowcharts.
- Drivers, files, and utilities — The latest drivers and BIOS updates to keep your system functioning at its best.
- Component support — Technical information, documentation, and troubleshooting tips for different system components.
- Online Communications Center — Tool for submitting requests for both technical and non-technical information on Dell products. Avoid telephone delays by receiving an e-mail response to your request for information if your filer is not functioning properly or if you have questions regarding your filer's hardware or operation.

Dell can be accessed electronically using the following addresses:

- World Wide Web

  http://www.dell.com/

  http://www.dell.com/intl/apcc/ (for Asian/Pacific countries only)

  http://www.euro.dell.com (for Europe only)

- Anonymous file transfer protocol (FTP)

  ftp.dell.com/

  Log in as `user: anonymous`, and use your e-mail address as your password.

- Electronic Support Service

  support@us.dell.com

  apsupport@dell.com (for Asian/Pacific countries only)

  support.euro.dell.com (for Europe only)

- Electronic Quote Service

  sales@dell.com

  apmarketing@dell.com (for Asian/Pacific countries only)

- Electronic Information Service

  info@dell.com

AutoTech Service

Dell's automated technical support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers.

When you call AutoTech, you use your touch-tone telephone to select the subjects that correspond to your questions. You can even interrupt an AutoTech session and continue the session later. The code number that the AutoTech service gives you allows you to continue your session where you ended it.

The AutoTech service is available 24 hours a day, seven days a week. You can also access this service through the technical support service. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

TechFax Service

Dell takes full advantage of fax technology to serve you better. Twenty-four hours a day, seven days a week, you can call the Dell TechFax line toll-free for all kinds of technical information.

Using a touch-tone phone, you can select from a full directory of topics. The technical information you request is sent within minutes to the fax number you designate. For the TechFax telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

TechConnect BBS

Use your modem to access Dell's TechConnect bulletin board service (BBS) 24 hours a day, seven days a week. The service is menu-driven and fully interactive. The protocol parameters for the BBS are 1200 to 19.2K baud, 8 data bits, no parity, 1 stop bit.

Automated Order-Status System

You can call this automated service to check on the status of any Dell products that you have ordered. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

Technical Support Service

Dell's industry-leading hardware technical-support service is available 24 hours a day, seven days a week, to answer your questions about Dell hardware.

Our technical support staff pride themselves on their track record: more than 90 percent of all problems and questions are taken care of in just one toll-free call, usually in less than 10 minutes. When you call, our experts can refer to records kept on your Dell system to better understand your particular question. Our technical support staff use computer-based diagnostics to provide fast, accurate answers to questions.

To contact Dell's technical support service, first refer to the section titled "Before You Call" and then call the number for your country as listed in "Dell Contact Numbers" found later in this chapter.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell Computer Corporation for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

Product Information

If you need information about additional products available from Dell Computer Corporation, or if you would like to place an order, visit Dell's World Wide Web site at **http://www.dell.com/**. For the telephone number to call to speak to a sales specialist, refer to "Dell Contact Numbers" found later in this chapter.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. Call Dell to obtain an authorization number, and write it clearly and prominently on the outside of the box.

   For the telephone number to call, refer to "Dell Contact Numbers" found later in this chapter.

2. Include a copy of the invoice and a letter describing the reason for the return.

3. Include a copy of the Diagnostics Checklist indicating any tests you have run and any error messages reported by the Dell Diagnostics.

4. Include any accessories that belong with the item(s) being returned (power cables, software diskettes, guides, and so on) if the return is for credit.

5. Pack the equipment to be returned in the original (or equivalent) packing materials.

   You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell Computer Corporation. Collect-on-delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at our receiving dock and returned to you.

Before You Call

NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Remember to fill out the Diagnostics Checklist (Figure 4-1). If possible, turn on your system before you call Dell for technical assistance and call from a telephone at or near the filer's console. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the filer's console. Make sure the system documentation is available.

WARNING: If you need to remove the computer covers, be sure to first disconnect the computer system's power and modem cables from all electrical outlets.

Diagnostics Checklist

Name: _____Date: _____

Address: _____Phone number: _____

Service tag (bar code on the back of the computer): _____

Express Service Code: _____

Return Material Authorization Number (if provided by Dell support technician): _____

Operating system and version: _____

Peripherals: _____

_____

_____

Expansion cards: _____

_____

_____

Are you connected to a network? ☐ yes ☐ no

Network, version, and network card: _____

Programs and versions: _____

_____

_____

_____

Refer to your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.

Error message, beep code, or diagnostic code: _____

Description of problem and troubleshooting procedures you performed: _____

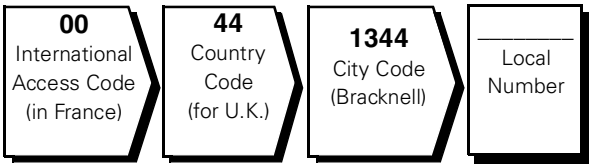
_____

_____

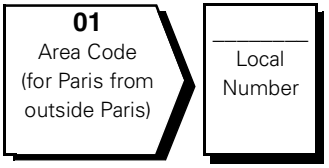
Figure 4-1. Diagnostics Checklist

Dell Contact Numbers

When you need to contact Dell, use the telephone numbers, codes, and electronic addresses provided in Tables 4-2 and 4-3. Table 4-2 provides the various codes required to make long-distance and international calls. Table 4-3 provides local telephone numbers, area codes, toll-free numbers, Web site and e-mail addresses, if applicable, for each department or service available in various countries around the world. If you are making a direct-dialed call to a location outside of your local telephone service area, determine which codes to use (if any) in Table 4-2 in addition to the local numbers provided in Table 4-3. For example, to place an international call from Paris, France to Bracknell, England, dial the international access code for France followed by the country code for the U.K., the city code for Bracknell, and then the local number as shown in the following illustration.



To place a long-distance call within your own country, use area codes instead of international access codes, country codes, and city codes. For example, to call Paris, France from Montpellier, France, dial the area code plus the local number as shown in the following illustration.



The codes required depend on where you are calling from as well as the destination of your call; in addition, each country has a different dialing protocol. If you need assistance in determining which codes to use, contact a local or an international operator.

NOTE: Toll-free numbers are for use only within the country for which they are listed. Area codes are most often used to call long distance within your own country (not internationally)—in other words, when your call originates in the same country you are calling.

Table 4-1. International Dialing Codes

Country (City)	International Access Code	Country Code	City Code
Australia (Sydney)	0011	61	2
Austria (Vienna)	900	43	1
Belgium (Brussels)	00	32	2
Brunei	—	673	—
Canada (North York, Ontario)	011	—	Not required
Chile (Santiago)	—	56	2
China (Xiamen)	—	86	592
Czech Republic (Prague)	00	420	2
Denmark (Horsholm)	009	45	Not required
Finland (Helsinki)	990	358	9
France (Paris) (Montpellier)	00	33	(1) (4)
Germany (Langen)	00	49	6103
Hong Kong	001	852	Not required
Ireland (Bray)	16	353	1
Italy (Milan)	00	39	2
Japan (Kawasaki)	001	81	44
Korea (Seoul)	001	82	2
Luxembourg	00	352	—
Macau	—	853	Not required
Malaysia (Penang)	00	60	4
Mexico (Colonia Granada)	95	52	5
Netherlands (Amsterdam)	00	31	20
New Zealand	00	64	—
Norway (Lysaker)	095	47	Not required
Poland (Warsaw)	011	48	22
Singapore (Singapore)	005	65	Not required
South Africa (Johannesburg)	09/091	27	11
Spain (Madrid)	07	34	91

Table 4-1. International Dialing Codes *(continued)*

Country (City)	International Access Code	Country Code	City Code
Sweden (Upplands Vasby)	009	46	8
Switzerland (Geneva)	00	41	22
Taiwan	002	886	—
Thailand	001	66	—
U.K. (Bracknell)	010	44	1344
U.S.A. (Austin, Texas)	011	1	Not required

Table 4-2. Dell Contact Numbers

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Australia (Sydney)	Customer Technical Support (Dell Dimension™ systems only)		1-300-65-55-33
	Customer Technical Support (Other systems)		toll free: 1-800-633-559
	Customer Care		toll free: 1-800-819-339
	Corporate Sales		toll free: 1-800-808-385
	Transaction Sales		toll free: 1-800-808-312
	Fax		toll free: 1-800-818-341
Austria * (Vienna)	Technical Support		0660-8779
	Customer Care	01	660 8056
	Switchboard	01	491 04 0
	Web site: support.euro.dell.com/at		
	E-mail: tech_support_germany@dell.com		
Belgium * (Brussels)	Customer Technical Support	02	481 92 88
	Customer Care	02	481 91 19
	Home/Small Business Sales		toll free: 0800 16884
	Corporate Sales	02	481 91 00
	Fax	02	481 92 99
	Switchboard	02	481 91 00
	Web site: support.euro.dell.com/be		
	E-mail: tech_be@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Brunei *NOTE: Customers in Brunei call Malaysia for sales, customer, and technical assistance.*	Customer Technical Support (Penang, Malaysia)		810 4966
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales (Penang, Malaysia)		810 4955
Canada (North York, Ontario) *NOTE: Customers in Canada call the U.S.A. for access to TechConnect BBS.*	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Customer Care (From outside Toronto)		toll free: 1-800-387-5759
	Customer Care (From within Toronto)	416	758-2400
	Customer Technical Support		toll free: 1-800-847-4096
	Sales (Direct Sales—from outside Toronto)		toll free: 1-800-387-5752
	Sales (Direct Sales—from within Toronto)	416	758-2200
	Sales (Federal government, education, and medical)		toll free: 1-800-567-7542
	Sales (Major Accounts)		toll free: 1-800-387-5755
	TechConnect BBS (Austin, Texas, U.S.A.)	512	728-8528
	TechFax		toll free: 1-800-950-1329
Chile (Santiago) *NOTE: Customers in Chile call the U.S.A for sales, customer, and technical assistance.*	Sales, Customer Support, and Technical Support		toll free: 1230-020-4823
China (Xiamen)	Customer Service		toll free: 800 858 2437
	Sales		toll free: 800 858 2222
Czech Republic* (Prague)	Technical Support	02	22 83 27 27
	Customer Care	02	22 83 27 11
	Fax	02	22 83 27 14
	TechFax	02	22 83 27 28
	Switchboard	02	22 83 27 11
	Web site: support.euro.dell.com/cz		
	E-mail: czech_dell@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Denmark * (Horsholm) *NOTE: Customers in Denmark call Sweden for fax technical support.*	Technical Support		45170182
	Customer Care		45170181
	Switchboard		45170100
	Fax Technical Support (Upplands Vasby, Sweden)		859005594
	Fax Switchboard		45170117
	Web site: support.euro.dell.com/dk		
	E-mail: den_support@dell.com		
Finland * (Helsinki)	Technical Support	09	253 313 60
	Customer Care	09	253 313 61
	Fax	09	253 313 99
	Switchboard	09	253 313 00
	Web site: support.euro.dell.com/fi		
	E-mail: fin_support@dell.com		
France * (Paris/Montpellier)	Technical Support (Paris)	01	47 62 68 90
	Technical Support (Montpellier)	04	67 06 62 86
	Customer Care (Paris)	01	47 62 68 92
	Customer Care (Montpellier)	04	67 06 61 96
	TechConnect BBS (Montpellier)	04	67 22 53 04
	Fax (Montpellier)	04	67 06 60 07
	Switchboard (Paris)	01	47 62 69 00
	Switchboard (Montpellier)	04	67 06 60 00
	Web site: support.euro.dell.com/fr		
	E-mail: web_fr_tech@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Germany * (Langen)	Technical Support	06103	971-200
	Technical Support Fax	06103	971-222
	Preferred Accounts Customer Care	06103	971-420
	Preferred Accounts Customer Care Fax	06103	971-544
	Customer Care	06103	971-500
	TechConnect BBS	06103	971-666
	Switchboard	06103	971-0
	Web site: support.euro.dell.com/de		
	E-mail: tech_support_germany@dell.com		
Hong Kong *NOTE: Customers in Hong Kong call Malaysia for customer assistance.*	Technical Support		toll free: 800 96 4107
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 800 96 4109
	Corporate Sales		toll free: 800 96 4108
Ireland * (Bray) *NOTE: Customers in Ireland call the U.K. for Home/Small Business customer assistance.*	Customer Technical Support		1-850-543-543
	Customer Care	01	204 4026
	Home/Small Business Customer Care (Bracknell, U.K.)		0870 906 0100
	Sales		1-850-235-235
	SalesFax	01	286 2020
	Fax	01	286 6848
	TechConnect BBS	01	204 4711
	TechFax	01	204 4708
	Switchboard	01	286 0500
	Web site: support.euro.dell.com/ie		
	E-mail: dell_direct_support@dell.com		
Italy * (Milan)	Technical Support	2	57782.690
	Customer Care	2	57782.555
	Sales	2	57782.411
	Fax	2	57503530
	Switchboard	2	57782.1
	Web site: support.euro.dell.com/it		
	E-mail: support_italy@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Japan (Kawasaki)	Technical Support		toll free: 0088-22-7890
	Technical Support (Server)		toll free: 0120-1984-35
	Technical Support (Dimension and Inspiron™)		toll free: 0120-1982-56
	Technical Support (WorkStation, OptiPlex™, and Latitude™)		toll free: 0120-1984-39
	Y2K Support	044	556-4298
	Customer Care	044	556-4240
	Direct Sales	044	556-3344
	Commercial Sales	044	556-3430
			556-3440
	Faxbox Service		03-5972-5840
	Switchboard	044	556-4300
Korea (Seoul) *NOTE: Customers in Korea call Malaysia for customer assistance.*	Technical Support		toll free: 080-200-3800
	Transaction Sales		toll free: 080-200-3600
	Corporate Sales		toll free: 080-200-3900
	Customer Service (Penang, Malaysia)		810 4949
	Fax		394 3122
	Switchboard		287 5600
Latin America *NOTE: Customers in Latin America call the U.S.A. for sales, customer, and technical assistance.*	Customer Technical Support (Austin, Texas, U.S.A.)	512	728-4093
	Customer Service (Austin, Texas, U.S.A.)	512	728-3619
	Fax (Technical Support and Customer Service) (Austin, Texas, U.S.A.)	512	728-3883
	Sales (Austin, Texas, U.S.A.)	512	728-4397
	SalesFax (Austin, Texas, U.S.A.)	512	728-4600
			728-3772

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Luxembourg * *NOTE: Customers in Luxembourg call Belgium for sales, customer, and technical assistance.*	Customer Technical Support (Brussels, Belgium)	02	481 92 88
	Home/Small Business Sales (Brussels, Belgium)		toll free: 080016884
	Corporate Sales (Brussels, Belgium)	02	481 91 00
	Customer Care (Brussels, Belgium)	02	481 91 19
	Fax (Brussels, Belgium)	02	481 92 99
	Switchboard (Brussels, Belgium)	02	481 91 00
	Web site: support.euro.dell.com/be		
	E-mail: tech_be@dell.com		
Macau *NOTE: Customers in Macau call Malaysia for customer assistance.*	Technical Support		toll free: 0800 582
	Customer Service (Penang, Malaysia)		810 4949
	Transaction Sales		toll free: 0800 581
Malaysia (Penang)	Technical Support		toll free: 1 800 888 298
	Customer Service	04	810 4949
	Transaction Sales		toll free: 1 800 888 202
	Corporate Sales		toll free: 1 800 888 213
Mexico (Colonia Granada) *NOTE: Customers in Mexico call the U.S.A. for access to the Automated Order-Status System and AutoTech.*	Automated Order-Status System (Austin, Texas, U.S.A.)	512	728-0685
	AutoTech (Automated technical support) (Austin, Texas, U.S.A.)	512	728-0686
	Customer Technical Support	525	228-7870
	Sales	525	228-7811
			toll free: 91-800-900-37
			toll free: 91-800-904-49
	Customer Service	525	228-7878
	Main	525	228-7800

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Netherlands * (Amsterdam)	Customer Technical Support	020	5818838
	Home/Small Business Sales		toll free: 0800-0663
	Home/Small Business SalesFax	020	682 7171
	Corporate Sales	020	581 8818
	Corporate SalesFax	020	686 8003
	Fax	020	686 8003
	Switchboard	020	581 8818
	Web site: support.euro.dell.com/nl		
New Zealand	Technical Support (Dell Dimension systems only) ($2.50 + GST per call)		0900 51010
	Technical Support (Other systems)		0800 446 255
	Customer Service		0800 444 617
	Sales		0800 441 567
	Fax		0800 441 566
Norway * (Lysaker) *NOTE: Customers in Norway call Sweden for fax technical support.*	Technical Support		671 16882
	Customer Care		671 16881
	Switchboard		671 16800
	Fax Technical Support (Upplands Vasby, Sweden)		590 05 594
	Fax Switchboard		671 16865
	Web site: support.euro.dell.com/no		
	E-mail: nor_support@dell.com		
Poland * (Warsaw)	Technical Support	22	60 61 99
	Customer Care	22	60 61 99
	Sales	22	60 61 99
	Fax	22	60 61 998
	Switchboard	22	60 61 999
	Web site: support.euro.dell.com/pl		
	E-mail: pl_support@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Singapore (Singapore) *NOTE: Customers in Singapore call Malaysia for customer assistance.*	Technical Support		toll free: 800 6011 051
	Customer Service (Penang, Malaysia)	04	810 4949
	Transaction Sales		toll free: 800 6011 054
	Corporate Sales		toll free: 800 6011 053
South Africa (Johannesburg)	Technical Support	011	709 7710
	Customer Care	011	709 7710
	Sales	011	706 7700
	Fax	011	709 0495
	Switchboard	011	709 7700
	Web site: support.euro.dell.com/za		
	E-mail: dell_za_support@dell.com		
Southeast Asian/ Pacific Countries (excluding Australia, Brunei, China, Hong Kong, Japan, Korea, Macau, Malaysia, New Zealand, Singapore, Taiwan, and Thailand—refer to individual listings for these countries)	Customer Technical Support, Customer Service, and Sales (Penang, Malaysia)		60 4 810-4810
Spain * (Madrid)	Technical Support		902 100 130
	Corporate Customer Care		902 118 546
	Home/Small Business Customer Care		902 118 540
	TechConnect BBS	91	329 33 53
	Corporate Sales		902 100 185
	Home/Small Business Sales		902 118 541
	Switchboard	91	722 92 00
	Web site: support.euro.dell.com/es		
	E-mail: es_support@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
Sweden * (Upplands Vasby)	Technical Support	08	590 05 199
	Customer Care	08	590 05 169
	Fax Technical Support	08	590 05 594
	Sales	08	590 05 185
	Web site: support.euro.dell.com/se		
	E-mail: swe_support@dell.com		
Switzerland * (Geneva)	Technical Support		0844 811 411
	Customer Care		0848 802 802
	Fax	022	799 01 90
	Switchboard	022	799 01 01
	Web site: support.euro.dell.com/ch		
	E-mail: swisstech@dell.com		
Taiwan *NOTE: Customers in Taiwan call Malaysia for customer assistance.*	Technical Support		toll free: 0080 651 226/0800 33 557
	Customer Service (Penang, Malaysia)		.810 4949
	Transaction Sales		toll free: 0080 651 228/0800 33 556
	Corporate Sales		toll free: 0080 651 227/0800 33 555
Thailand *NOTE: Customers in Thailand call Malaysia for customer assistance.*	Technical Support		toll free: 0880 060 07
	Customer Service (Penang, Malaysia)		.810 4949
	Sales		toll free: 0880 060 06
U.K. * (Bracknell)	Technical Support Department		0870-908-0800
	Corporate Customer Care	01344	720206
	Home/Small Business Customer Care		0870-906-0010
	TechConnect BBS		0870-908-0610
	Sales	01344	720000
	AutoFax		0870-908-0510
	Web site: support.euro.dell.com/uk		
	E-mail: dell_direct_support@dell.com		

* *For technical assistance in this country after normal working hours, use one of the following numbers: (353-1) 204 4008 or (353-1) 286 5908 (English only—the call is rerouted to the U.S.A.).*

Table 4-2. Dell Contact Numbers *(continued)*

Country (City)	Department Name or Service	Area Code	Local Number or Toll-Free Number
U.S.A. (Austin, Texas)	Automated Order-Status System		toll free: 1-800-433-9014
	AutoTech (Automated technical support)		toll free: 1-800-247-9362
	Dell Home and Small Business Group:		
	Customer Technical Support (Return Material Authorization Numbers)		toll free: 1-800-624-9896
	Customer Service (Credit Return Authorization Numbers)		toll free: 1-800-624-9897
	National Accounts (systems purchased by established Dell national accounts [have your account number handy], medical institutions, or value-added resellers [VARs]):		
	Customer Service and Technical Support (Return Material Authorization Numbers)		toll free: 1-800-822-8965
	Public Americas International (systems purchased by governmental agencies [local, state, or federal] or educational institutions):		
	Customer Service and Technical Support (Return Material Authorization Numbers)		toll free: 1-800-234-1490
	Dell Sales		toll free: 1-800-289-3355
			toll free: 1-800-879-3355
	Spare Parts Sales		toll free: 1-800-357-3355
	DellWare[SM]		toll free: 1-800-753-7201
	DellWare FaxBack Service	512	728-1681
	Fee-Based Technical Support		toll free: 1-800-433-9005
	Sales (Catalogs)		toll free: 1-800-426-5150
	Fax		toll free: 1-800-727-8320
	TechFax		toll free: 1-800-950-1329
	TechConnect BBS	512	728-8528
	Dell Services for the Deaf, Hard-of-Hearing, or Speech-Impaired		toll free: 1-877-DELLTTY (1-877-335-5889)
	Switchboard	512	338-4400

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